

Naturalists and  
their Investigations



11



“HERE I AM STILL.”

[p. 92

*Thomas Edward at work as a shoemaker in his house at Banff.*



# NATURALISTS

## AND THEIR INVESTIGATIONS.

*LINNÆUS—EDWARD—CUVIER—KINGSLEY.*

BY  
GEORGE DAY, F.R.M.S.

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AUTHOR OF "THE LIFE-WORK OF HENRY NAIRNE DOWSON," "NATURAL  
HISTORY NOTES," ETC., ETC.



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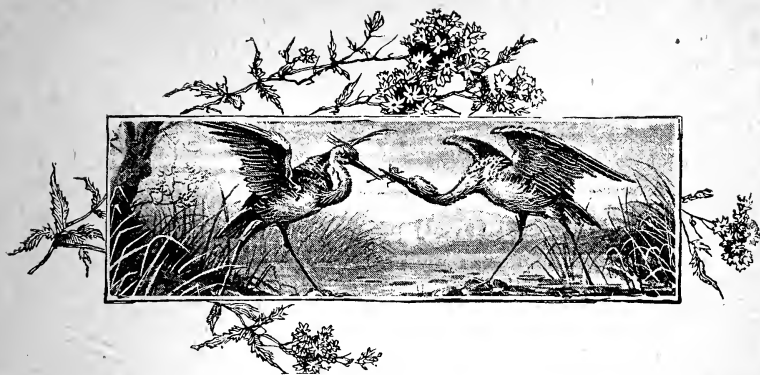
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## PREFACE.

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IT has been well said that “the study of Nature requires two qualifications of the mind, which at first sight appear to be opposed to each other—the comprehensive view of a bold genius that embraces the whole, and the minute and careful inspection of an unwearied industry that lives upon the smallest objects.”

No doubt the beginnings of natural history consisted in the knowledge, which the early races of mankind could not fail to acquire, of all those larger animals which, inhabiting the earth or its waters, were either of value for food, or a source of danger from their size and ferocity. Natural history as a whole is the aggregate history of all known species of animals. A naturalist is popularly supposed to be the man who can take any animal and give it a name, and place it

in some particular drawer or pigeon-hole in the great cabinet of Nature.

Most of the naturalists of the seventeenth century, and the early eighteenth, concerned themselves with classification ; not a few of them became merely collectors, and in order to study natural history scientifically, we must start with a foundation of a systematic classification of some kind.

It is generally considered that, from a naturalist's point of view, the seventeenth century was the dawn of the "golden age." The torch of zoological discovery lighted by Aristotle, after flickering fitfully in the hands of his successors, had become extinguished, until the dawn of the seventeenth century gave rise in Britain to a number of eminent men, who devoted themselves to the study of zoology and botany, and who, for the time being, placed England in the front rank as regards the advancement of natural science. Those who were the first to re-light the torch were Ray and Willoughby. The works of these worthies were concerned with classification, and theirs was the first completed systematic list of the whole animal kingdom which had been attempted up to that time. This, however, was not destined to live long, as it was superseded by the system adopted by Linnæus the great Swedish naturalist, known to zoologists as his "*Systema Naturæ*." Linnæus is, of course, better known as a botanist ; his fame as a zoologist is based upon the classification of the animal kingdom.

Cuvier gave an enormous impulse to the study of natural history, and by his genius and labour effected in scientific zoology vast improvement. By his researches in various departments of natural history,

such as the lower larynx of birds, the anatomy of the Roman snail, *Helix pomatia*, the circulation of the Invertebra, the structure and classification of Mollusca, and the arrangements of Invertebra generally. By his prodigious labours and searching investigations, he became, by universal consent, the first of living naturalists; and the scientific honours which were conferred upon him are too numerous to mention.

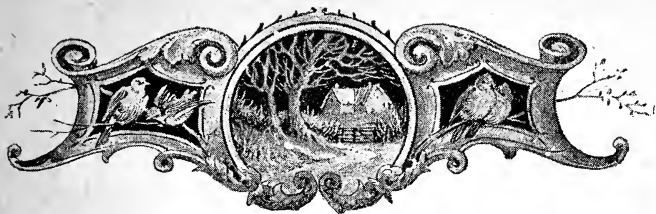
The remaining two sketches in this volume are of representative scientific men—the one a Scotchman, and the other an Englishman. These four brief memoirs clearly show that it is not men of genius alone who accomplish the greatest and most lasting work, but rather men of steadfastness, purpose, and above all indefatigable industry. Such lives as these deserve to be had in everlasting remembrance, and should serve as indelible “footprints,” that those who follow after, though disheartened and discouraged, “may take heart again.” It is for this purpose that these short accounts are written, in the preparation of which all available information has been sought out: the various works in French, Swedish, and Dutch have been consulted; a knowledge of the several localities obtained; and, as far as it was possible, communications received from friends, in order to increase the interest, and enhance the value of, NATURALISTS AND THEIR INVESTIGATIONS.

Amongst the very many eminent students of nature who have lived and laboured, it was difficult to select such as would prove of the greatest interest to the general reader, and of the four chosen, space has allowed only of a general idea of the work of each.

The facts of nature are open to the peasant and the mechanic, as well as to the philosopher and scholar ; and all are capable, in greater or lesser degree, of making use of those facts to the best of their power, so that even among the lowliest, the true worker may achieve the loftiest results.

G. D.





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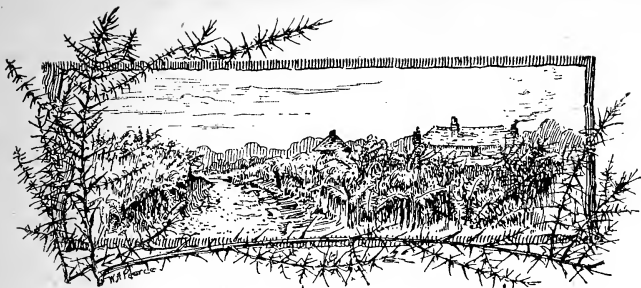
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CHARLES LINNÆUS.





# NATURALISTS AND THEIR INVESTIGATIONS.

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## I.

### CHARLES LINNÆUS.

“The heights by great men reached and kept  
Were not attained by sudden flight ;  
But they, while their companions slept,  
Were toiling upward in the night.”

LONGFELLOW.

IT has been well said that, though the lives of men devoted to silent study and secluded labour contain few of those stirring incidents which embellish the biographies of statesmen and heroes, they are scarcely less alluring and instructive. No page of human history is so significant as the record of those early influences which develop the character and direct the lives of our great men. It shows how young men have overcome difficulties, poverty, and illness ; how they

have made even failures to become stepping-stones to success. It shows the result of energy, and that, by persevering and untiring devotion, they can win their way against all opposition.

The history of Linnæus is indeed a romance. Few have had such struggles with poverty ; few have come off such conquerors. Not many lives have given to the world such lessons of cheerfulness, of perseverance, and of untiring industry.

The study of plants has interested mankind from the earliest times, and in the older histories are recorded the works of those who spent their lives in learning the beauties and mysteries of the vegetable world.

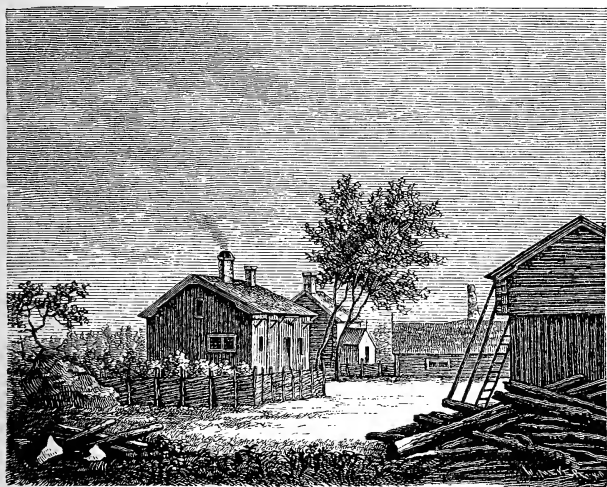
At first these investigations were carried on as an aid to the study of medicine. But later, attention was given to the subject by men who were interested in knowledge of all kinds, until they became the interpreters of the mysteries of the vegetable world. But though the study of botany received the attention of the learned in past years, it was long before any successful attempt was made to arrange plants into different classes ; and until this was done botany could never take its proper place among the sciences.

Many attempted a classification without perfect success ; but at length the great Swedish naturalist, Linnæus, solved the difficulty, and offered a plan, which, if not perfect, was at least so complete as to enable naturalists to follow their studies with greater ease than formerly had been possible.

In the province of Småland, situated in the south of Sweden, at the little village of Rashult, Carl von Linné—better known as Charles Linnæus—was born May 23rd, 1707. His father became pastor of the village, and possessed a fine taste for flowers, which in

the rectory garden he cultivated most successfully, introducing so many rare exotics into his collection, that the small plot of ground soon became famous, even far beyond the limits of the parish.

All the Linné family were passionately fond of botany, and took their name from the great linden, or lime tree, which towered above the houses of their



LINNÆUS' BIRTHPLACE AT RASHULT.

native village. There is no lime tree growing there now, but evidently one existed at the time of which we write. It is not unusual for Swedish families to name themselves after natural objects.

In this district, the peasants regard the lime tree as sacred ; and in early spring they deck the graves of their friends with its fresh green boughs. A large linden tree would always be an object of note in a land where the pine, spruce fir, and birch predominate.

The tradition of its three branches dying at the extinction of the Linné family, and the dead stump remaining, is doubtless a legend.

From the time young Carl left his cradle, he almost lived in his father's garden, which was planted with the rarer shrubs and flowers; and thus were kindled, before he was well out of his mother's arms, those sparks which shone so vividly all through his life, and latterly burst into brilliant flame.

The same thing that is said of a poet may be said without impropriety of our botanist. Carl was "nursed in beauty, fragrance, and pure delights." His toys were flowers, and his mother used to stop his cries by giving him a flower to play with. The smallness of the rector's income obliged him to exercise the utmost economy. He was his own gardener, and his child, his constant companion, enjoyed to the full

"Delight and liberty, the simple creed  
Of childhood, whether busy or at rest."

The favourite taste of the father was quickly imbibed by the child, who tried eagerly to yield such slight aid as his childish powers permitted. Some of his earliest recollections refer to the sight of groups of admiring friends, listening respectfully while the good rector talked learnedly about one or other of his flowers, much to the gratification of his hearers.

Very soon a garden of his own was given to Carl; and then, besides collecting from the home plot, the whole country side was laid under contribution, and wood, meadow, and hill, had all to give up their treasures to the boy, who sought them with untiring zeal. Many strange things found their way into the little enclosure; common wild-flowers and poisonous weeds were alike cherished with roses and lilies, and had it not been

for the intervention of the father, colonies of wild bees and wasps would have been domiciled in Carl's garden; but as these threatened the safety of the hive bees, he was compelled to allow them to depart to the wild haunts from which he had brought them.

The boy studied the secrets of bud, leaf, and perfect flower with such eagerness that, before he was eight years old, all the four hundred different plants in his father's collection were perfectly familiar to him, and he could understand his father's interesting talks about their nature and properties; and the rector took care that the knowledge thus gained, should be of the most practical and accurate character.

In his autobiography, Linnæus records that he accompanied his father to a feast at Möckeln. In the evening the guests seated themselves on the flowery turf, listening to their pastor, who explained to them the names and properties of various plants, showing them roots, and detailing their functions. The child paid deep attention to all he saw and heard, and from that time never ceased harassing his father with questions about the name, quality, and nature of every plant he met with; but though his memory was good, and afterwards became remarkable from its constant exercise, childlike he forgot the names of the plants, and the answers to most of his questions. His father therefore refused to impart more information until Carl showed with his curiosity a determination to remember—and to this early discipline he ascribed his tenacious memory, which, added to his sharpness of sight, laid the foundation of his eminence as a reforming naturalist.

Carl's father was his tutor in other things besides botany. He taught him Latin and geography, with

theology, so as to qualify him for the pulpit. This training was continued until he was seven years old, when his play days with weeds and wasps had to cease, and his school life begin.

Carl's school life commenced under the care of John Tiliander, a relative,—a man passionate and morose, ill adapted for the instruction of youth, especially such a one as Carl. Tiliander preferred and practised the infliction of stripes and punishments, rather than the giving of encouragements and admonitions.

At the age of seventeen, Carl went to a gymnasium or high school, to be taught the classics, and otherwise to be made ready to succeed his father in the ministry. But he had no aptitude for languages, theology, or metaphysics: his passion was for plants and flowers; so he obtained two books on botany which he read day and night, even committing them to memory. He thus gained the name of "The Little Botanist."

It was a great disappointment to his father when, on a visit to the school, he was told that his son was quite unfit for the ministry, and that he would probably make a good tailor or shoemaker.

Poor as he was, the rector had kept his boy at school for twelve years, hoping for better things. The blow was a severe one, and both father and mother took the complaints of professors and teachers very much to heart, foreseeing in the evil report the probable ruin of their fondest hopes.

The mother argued thus: "His father loved plants, too, yet he got the divinity and theology into his head,—why could not Carl? Was all the rise in the family to go for nought? Were they to be again degraded to the ranks of the peasant? He must toil at this uncongenial study, for his forefathers' sake, and

for theirs. His father had no money to give him, and the boy could not expect to live by picking flowers."

Consultations were held between father and son, until at length, with filial obedience, Carl declared his readiness to study Divinity, but owned at the same time his want of inclination and his great dislike. His father, seeing how things stood, therefore resolved to set him free, and to bind him apprentice to some honest cobbler. There was one person, however, who appreciated the form of industry shown by the boy. This was the old physician and friend of the family, Dr. Rothman. On him the father called, and with a heavy heart told his trouble. Rothman suggested that perhaps the boy might like medicine, and accomplish some good work in natural history, and at once offered to take the lad into his own home, and give him lessons in physiology.

This kind offer was accepted, and proved a great comfort to both parents, especially to the mother.

At the good physician's house in Wexio Carl took up his abode, and became happy under this new arrangement. It was, indeed, the decisive period in his career, for while living with the doctor Carl's life-work was commenced.

He here came across the writings of Tournefort, the greatest botanist of that day, and was so impressed by these writings that he decided to devote his life to the especial study of botany. All his energies were very soon directed to that end, and he worked to such good purpose that, on leaving Wexio at the end of three years, he had laid the foundations of that vast knowledge for which he afterwards became so famous.

Carl attempted to arrange, in systematic order, the plants growing around him, which being Swedish,

varied considerably from the French examples of Tournefort. He at once saw and felt the imperfection of this great botanist's system.

If he could but perfect this system, or invent one which would be less incomplete! This was his dream—a fine ambition for a youth of seventeen.

He saw the difficulties attending classification, and had at this time got ahead of his good tutor, Dr. Rothman, who was content to work with his old text-books.

About this date Carl happened to meet a former preceptor, one Gabriel Hök, who had been entered as a tutor at the University of Lund, and at Christmas Carl invited him to his parental home, in order to gain information concerning the University.

Hök spoke well of Carl, and praised his abilities greatly—cheering the hearts of the parents, and increasing the happiness of that Christmas holiday.

Many consultations were held, as to the practicability of entering Carl as a student at Lund, but his parents feared the risk, as well as being unable to furnish the necessary funds. As he did not return to Wexio, he remained at home in an unsettled condition, and matters were beginning to look serious, when a relative, in the person of Professor Humerus, again urged his being sent to the University, and offered to provide for him so long as he should need it.

The joy of the whole family knew no bounds, and Carl at once proceeded to Wexio to obtain the necessary testimonials for entering the University.

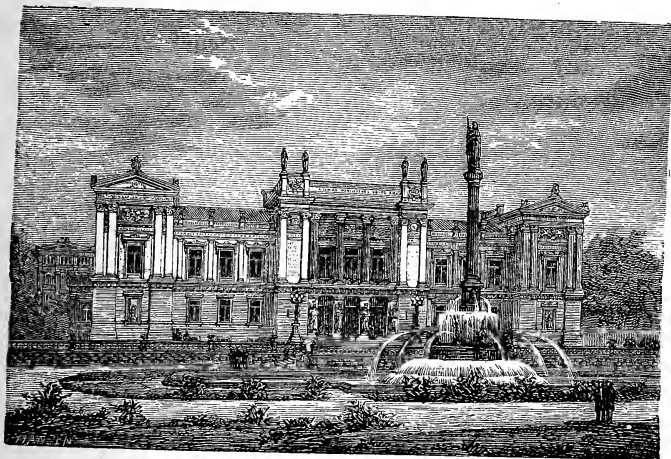
Amongst others he applied to the rector of the high school, where he had attended previous to residing with Dr. Rothman. He received from him the following curiously worded document as a testimonial:—



"Youth at school may be compared to shrubs in a garden, which will sometimes, though rarely, elude all the care of the gardeners; but if transplanted into a different soil may become fruitful. With this view, therefore, and no other, the bearer is sent to the University, where it is possible that he may meet with a climate propitious to his progress.

"Signed, NILS KRÖK, *Rector*."

Linnæus speaks of this as not being a very creditable certificate.



UNIVERSITY OF LUND.

At the age of twenty, in the year 1727, Carl matriculated at the University of Lund, in Skåne, South Sweden, where his father had studied and contended with poverty for many years. Happily, the young man had a friend at the University in his former preceptor, Gabriel Hök, who kept back the doubtful recommendation, and procured his entry as one of his private pupils.

On his birthday, May 23rd, 1727, Carl started from his native village for the University of Lund, where

he was to meet his relative, Professor Humerus, who had promised to support him during his academic career. Too poor to ride, he set out to walk, giving himself four days to accomplish the journey of eighty-four English miles—twenty-one miles a day. Not being encumbered with luggage, the journey promised to be a pleasant one, for the future appeared to be bright, joyous, and full of hope. So with a light step, on that bright May morning, he turned his back on his native village, building those aerial castles so common to youth. Passing through numerous hamlets and forests, and over fell and plain, viewing the beauties of hill and vale, crossing lake and river, revelling in the beauties of the wild-flowers—cowslips, orchis, marsh marigolds, and pansies—hearing in the song of lark and thrush a welcome to the stranger, which he took as a good omen, he trudged onward. It was throughout a pleasant journey; and as on the fourth day he descended, once and for all, to the plain of Skåne, he knew that ten miles farther would bring him to Lund. When mile after mile had been traversed, and he at last saw the towers of the University city, Malmö, with the sea beyond; and farther still, on the dim horizon to the right, he made out the towers of Copenhagen, the thought bewildered him, he sat down to think; for that golden distance seemed to him like a vision of his own life. He thought on, until the sinking sun recalled him to a sense of the passage of time, and he remembered that he had yet some distance to travel and, being a stranger, he had his lodging to seek. So starting afresh, though weary and footsore, Carl at length entered the town.

The name of Lund in Swedish signifies “a pleasant grove.”

In the dim twilight he wandered through the streets round the old cathedral, past the hospital and University, charmed with all he saw, and feeling that in very truth a new life was opening before him.

It was too late for him to seek his cousin, Carl Tiliander, who was connected with the University, or to present his credentials to his learned relative, the professor; so selecting a modest-looking inn, suitable to his small means, he enjoyed his supper, after which he sat up until the early hours of the morning, to record his travels, and to note down his experiences by the way; for throughout his life he kept a diary of what he saw and did. Then he retired to rest, and slept soundly, not waking till long after the sun had risen, and when it was already high in the heavens. Having no watch he knew not the hour, for it is difficult in Sweden to know when to rise during summer, or when to retire, as daylight is no guide; and in the winter the same difficulty occurs, for the darkness is as perplexing as the light.

Hastily rising, and not staying to break his fast, he hurried out to find his cousin. He mingled with the crowd composed of students, and eagerly sought for his relative, but without success. He wandered into the cathedral, awed by the grandeur of the edifice, the like of which he had never seen. A funeral service was going on, the bier was laid in front of the altar, and the coffin covered with wreaths, flags, and memorials, denoting that he who lay within was a person of some distinction.

Not feeling interested, Carl walked round the building engrossed by what he saw on tomb and tablet; recalling to his mind the old stories of the past, heard at his village home from the lips of his

father, who in his youthful days had worshipped before the selfsame altar.

Leaving the building, with its solemn service for the dead, Carl wended his way towards the University; and passing under the elm groves, buried in thought, he accidentally jostled against a student who, whilst walking, appeared to be absorbed in a book. Both commenced to apologise, and while so doing, Carl recognised his cousin, to whom he at once made himself known. He was overjoyed with his good fortune; but his relative appeared cool, and not at all inclined to acknowledge the relationship; and the perusal of the unfortunate certificate which Carl presented to him, stopped immediately any slight desire for friendship, if such ever existed.

The cousin looked upon Carl as nothing more nor less than an unpromising young scamp, a ne'er-do-well, and one that he could not for a moment acknowledge. So reading him a short lecture as to the folly of pursuing evil ways, he coolly bade him good-morning, and passed on out of sight.

The bells from the cathedral tower now began to utter their doleful notes for the funeral. Astounded at the cool reception accorded him by his relative, Carl awaited with the crowd the passing of the funeral procession. Numerous students of the University followed, certain officials carrying banners with black cockades, and a profusion of crape. It was evident that this was the funeral of some great person; the respect shown by all was profound, and in wonderment, Carl asked of a bystander who it was that they so honoured.

"It is a professor of the University—Professor Humerus."

Carl was speechless. He joined the procession,

and once more gazed at the coffin which contained the remains of his only friend in that cathedral city.

He was indeed chief mourner, though unknown to those by whom he was surrounded. He felt stupefied, and remained until the last service had been performed and the company had dispersed. What was he to do? At no time did the shoemaker's bench seem so near as now. His cherished hopes blighted, the bright May morning had disappeared, and around the future hung a veil of black despair.

Seating himself on a tombstone in a state of great dejection, some one, attracted by his woe-begone appearance, came to him and spoke. The tone seemed familiar. Where had he heard it? Was he dreaming? On looking up he found it was Gabriel Hök, who paid that long-remembered visit to the old home so far away, on that never-to-be-forgotten Christmastide, and who had spoken well of the lad to his father and mother.

“Carl! Carl! What do you here?”

The sad story was soon told. Serious consultation took place. Ways and means were discussed, and arrangements made. By Hök's help, Carl was presented to the dean and rector. The obnoxious certificate was withheld. Admittance to the University was gained, and once more the clouds were rolled away, and the future looked full of promise and hope.

Carl was poor. How he managed to attend the lectures and keep his terms we know not; no doubt by the assistance of his friend Hök, although he was a poor man himself. Carl did attend the lectures, and amongst others those of the famous botanist, Kilian Stobæus. These benefited the young student wonderfully, and made more exact the knowledge

he already possessed, bringing him also under the observation of this master of science.

Inquiries were made by Stobœus, who was soon informed of the indigent condition of Carl, and the need there was for a little help. Stobœus at once offered to take him into his own family free of all expense.

Here great advantages offered themselves; the library of the professor was rich in botanical works, and these were eagerly sought out and studied, the midnight oil being burnt in order to master their contents.

Thus his knowledge vastly increased; the natural history museum and botanical garden of Lund were open to him, and he was also permitted to attend Stobœus' demonstrations. With all these advantages Linnæus made rapid advances in his own particular branch of botanical science, the study of plants.

Hök, who had now become professor of the University, was always kind to Carl, but through Carl having taken up the botanical branch of study, he was withdrawn from Hök's notice, he himself being a teacher of Divinity.

Having unfortunately been bitten by a venomous reptile, Linnæus went home to recruit, and again met his former friend and benefactor, Dr. Rothman, who was delighted beyond measure at the success of his former *protégé* and pupil. He now recommended Carl to leave Lund for Upsala, the latter being a special school for botany and medicine.

"But how is he to go? What is he to live on?" asked his mother.

"Never fear, mother; I will work my way," replied Carl.

So once more a family council was held, to which good Dr. Rothman was admitted, and it resulted in

a decision to spare the sum of two hundred silver dollars—eight pounds—from the family treasury.

So with this amount, his father's blessing, and his mother's love, Carl set out for Upsala on his way to fame and fortune. With a still face, more touching than if it had been bedewed with tears, the mother watched her stalwart boy depart. Father and mother



HOUSE IN UPSALA IN WHICH LINNÆUS LODGED.

then turned, and sobbed in each other's arms, praying for their son, the hope of their age and weakness, for whom they had no other help than prayer.

The distance from Lund to Upsala is seventy-five Swedish, or five hundred English, miles. In this University—the first and most ancient seat of Swedish learning, and the scene in after years of his greatness—Carl underwent a severe process of training.

He arrived at the city, the poorest student that

ever entered its University. We are told that he had eight pounds sterling, but it takes the most rigid economy, even in Sweden, to square it with a journey of five hundred miles, clothes, board, lodging, and tuition for twelve months. How it was done we know not, for even in his famous diary this prodigious feat is not mentioned ; and to this day it remains a mystery.

He was fortunate in meeting with a fellow-student named Arledi, who was also an enthusiast in the study of natural history. They became brothers, not only in their studies but also in their poverty.

Time passed on ; a year had gone, a second winter was approaching, but means did not arrive. Scholarships were not for them, and there were few chances of obtaining private pupils. The woodland fruits were over, nuts and edible roots were also gone. The fish they caught and, after examination, cooked and ate with their rye biscuit, would soon be a luxury of the past. Starvation stared them in the face, and they could only comfort each other with the wise saws of their nation, such as, "Nothing like poverty for strengthening the character" ; "Many things are far more precious than a full stomach" ; and such like.

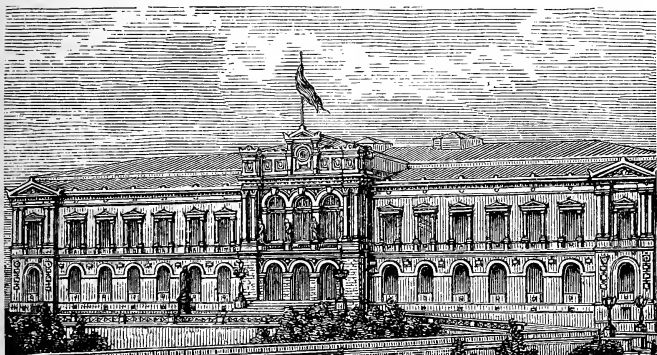
Carl's pockets were empty ; he subsisted on accidents, picking up a meal here and there by helping backward students, and from the charity of others.

He learned one great lesson in natural history, that, of all God's creatures, man alone is poor. His clothes gave way, so that he was often glad to accept the garments of others to replace his own. His shoes would hardly hold together, though he had mended them with cards and folded paper, stitched them neatly and carefully with birch bark, and soled them so repeatedly that he thought he had better get new



upper leathers put to them for a change ; until at last nothing was left of them but the strings ; and, besides, there were irreparable defects in his general equipage, which could not be concealed by any amount of coaxing, darning, or sitting cross-legged.

He often spoke of this time in after years, and especially mentioned it in his installation speech in 1741 as professor at Upsala, telling how, under severest poverty, he could return thanks to God, whose divine providence guarded and supported him. He thus made



UPSALA UNIVERSITY.

his own case an encouragement to other poor students, as well as a lesson in patience ; for victory does not come with a leap, her path must be laboriously prepared.

Thus passed away the winter, during which cold and famine fought over his frame ; when even his mind starved in the noontide twilight, without even a rushlight to warm body or soul ; when, at night, he would shiver for hours until, from sheer exhaustion, he fell asleep. Each day at dinner-time he felt the need of a meal ; and though he fought the feeling by trying to absorb himself in a book, he found his mind

wandering through faintness, and he was compelled to lie down till the sensation had passed. When he had the good fortune to possess a rye biscuit he was glad to munch it by the stoke-hole fire in the plant house ; yet through all this, though at times desponding, his faith was not entirely starved out of him, so sure was he that for him a new life would begin ere long.

His one great comfort and hope was that Celsius—a noted professor who for a long time had been absent from the University—might soon return, and take notice of him and become his friend because of his great love and knowledge of natural history. This hope had buoyed up the two friends during this trying period, while they had both suffered all the discomforts of poverty, until at last a crisis was reached, and Linnæus had decided to leave Upsala, to seek elsewhere for some employment by which he could gain a livelihood. But the darkest hour of the night is said to be that just before the dawn. Celsius returned at this time, and the learned professor and poor student met by accident in the garden ; and by conversation and questioning, Celsius was surprised and delighted with the unusual amount of learning and knowledge possessed by Carl. Finding out his straitened circumstances he took him at once into his own house, and allowed him the full use of his library, which was exceedingly rich in botanical treasures, both in books and specimens.

Carl soon became tutor to the professor's children, and so brighter days again began to dawn. Other pupils were quickly obtained, which caused a little money to flow into the empty pockets.

About this time a copy of a book by Le Vaillant on "The structure of flowers" fell into his hands, by which his curiosity was excited to a close examination

of the stamina and pistils, and seeing at once the essential importance of these parts of the plant, he formed the design of a new method of arrangement founded upon these organs. This was the occasion of the first dawn of the idea of that great system upon which his subsequent fame was based.

Soon afterwards he obtained the appointment of Assistant Lecturer to the famous Dr. Rudbeck in the botanical garden at Upsala, and from that time his success was assured. Though he had as yet but little money, he had leisure, in which he began his great works : "*Bibliotheca Botanica*," "*Classes Plantarum*," "*Critica Botanica*," and "*Genera Plantarum*." These kept him employed for seven long years, "letting," as he said, "not a moment pass unoccupied during my residence in Upsala. For the latter work I examined the characters of eight thousand flowers."

Then it was that Upsala awoke and found out Linnæus. At the great learning of the once poor and despised student all the city was astounded, and ere long the whole of Sweden was ringing with the name of him who was destined to confer lasting honour upon his country, and not his country only, but the whole scientific world.

Through the influence of friends, he succeeded in obtaining an appointment to investigate the natural history of Lapland. This he undertook, and carried out with the greatest success ; and returning to Upsala, he commenced a course of private lectures on medicine. So bitter, however, was the envy of the professors, especially of Rosen, that they used all their influence to prevent Linnæus from obtaining the means of subsistence, and even prevailed upon the archbishop to prohibit private lectures.

Thus, once more deprived of his livelihood, he turned his attention to mineralogy, and, to increase his knowledge, visited the mines of Sweden, and investigated generally the productions of the country.

This work was continued through many years, during which he gained experience, added to his knowledge, and increased his fame.

On his return to Upsala he was overwhelmed with grief on hearing of the death of his mother.

Poor mother ! Her sun had gone down while it was yet midday. She had borne the burden and heat of the noontide, but the season of rest, of ingathering and rejoicing, she saw not in this life ; for she was laid in her lowly grave in the shadow of the little church of Steinbrohult at a comparatively early age.

This loss of his mother was indeed a heavy stroke for Linnæus, and all the more so as he felt he had not been a comfort to her ; his career had hitherto been a source of continued disappointment, or at least of hope deferred. "Alas ! alas ! my mother !" was all that he could say, as the tears fell thick and fast. She had witnessed his poverty and his heroism, but she was not to witness his success. We can only have one mother, and when she is gone no one can ever take her place. Linnæus wore deeper mourning for her in his heart than on his person. The memories of all her many kindnesses and lavish love to him were sad but very precious relics.

On arriving at Dalecarlia he met the eldest daughter of a Dr. Moræus—Sara Elizabeth—and Linnæus himself in his diary records the meeting :—

"I was struck when I first saw her, and felt my heart assailed by new sensations and anxieties.

Nature is nature wherever you find it, whether in the land of Romeo or of Linnæus."

The maiden was nothing loth, she admired this youth, who despised the gods of her family—cash and comfort—and he loved her, partly for her beauty, but most of all for her kindly sympathy; for she "believed in me when none else would."

It was with some feelings of trepidation that he approached her father, in order to make his proposals, after assuring himself of the favourable dispositions of Sara Elizabeth towards him. The worthy doctor thought well of Linnæus, but not of his prospects; he hesitated about giving his consent, and eventually decided that, after a probation of three years, he would give his final answer. Looking at things practically, the financial prospects of the youth did not appear bright. Upsala did not want him, without money he could not publish his works on botany, and for the present he saw no means whereby he could ensure a livelihood. A man usually achieves but little who does not fight his way at every step.

Now, indeed, for love's sake he must make his mark, and at once procure some settled and remunerative employment. He was advised to take a doctor's degree, and for this purpose he decided to proceed to Harderwyk in Holland.

This having been accomplished, he next went to Leyden, and there made the acquaintance of the great naturalist Gronovius, who was so astonished when Linnæus showed him his "*Systema Natura*," that he offered to publish it at his own expense.

What a triumph! His talents were at last to be recognised. What mattered poverty or even hunger now? He was to be known as the author of the new

system. But he forgot that few people saw the necessity for a new system, or indeed for any system at all.

However, the publication of the work was at once commenced ; but an engraved work, finely got up on fourteen folio pages, takes some time to prepare, and to distribute it profitably takes much longer. This work was, however, completed, and is now a great bibliothecal curiosity. It was the germ from which most of the zoological systems have sprung that are in use at the present time, and by many botanists it is still preferred to any other.

The publication of this work brought Linnæus to the notice of all the eminent naturalists of the world, and procured for him attention wherever he appeared ; and throughout Europe he received the most distinguished favours.

He could not, however, afford to remain in Holland till his great system was adopted ; he must work to live, and paying work had yet to be found.

By the advice of Gronovius, Linnæus waited upon the celebrated physician Boerhaave, and after being in attendance for eight days he obtained an interview. The antechamber of this illustrious man was as much crowded as that of a minister of state, and even Peter the Great was unable to obtain immediate access to him. So far had the renown of this oracle of medicine extended, that a letter from the Emperor of China, simply directed to " Boerhaave, the famous physician in Europe," was duly delivered.

Boerhaave showed Linnæus his garden stocked with all plants that would bear the climate, and Linnæus had thus an opportunity of proving his skill in the science of botany, of which he availed himself to such an extent that Boerhaave advised him to remain in

Holland. This advice Linnæus was unable to follow. His money was expended, and he too well knew the disposition of his intended father-in-law to trouble him on that matter. So he decided to journey to Amsterdam.

On leaving, Boerhaave, wishing to serve him, gave him a letter of recommendation to Professor John Burmann, who received him very cordially, conducted him over his own collection, and through the great botanic garden of the city. Burmann, at this time, was preparing his great work on the plants of Ceylon, and he became so charmed with Linnæus that he offered him employment, to be his guest, and to help him in his work. This offer was gladly accepted. During the time he was thus engaged Linnæus published a small octavo volume of thirty-six pages, entitled "*Fundamenta Botanica*," which contained the essence of botanical philosophy.

While at Amsterdam Linnæus became acquainted with a rich banker named Clifford, who was an enthusiastic botanist, and who became so delighted with the stranger that he invited him to live with him, as his physician and botanist, at a salary of one hundred florins per annum. This offer was accepted.

In the year 1736 Linnæus paid a visit to England at the request and expense of Clifford. He was desirous of obtaining various botanical novelties for his collection, and also of communicating with some of the most celebrated botanists of the day.

Linnæus proceeded to Rotterdam, and from thence to Harwich, which he reached in eight days. From this well-known seaport he travelled by road to London. The road ran by the river Stour to Colchester, by Tiptree Heath, Witham, Chelmsford, Brentwood, and Stratford; and entering the world's

metropolis by way of Bow, Linnæus reached Charing Cross, where he considered his journey at an end.

Linnæus is said to have been much impressed with London. Very few of his observations on the natural history of this country are preserved, but a tradition has been handed down, that the golden bloom of the furze on the commons round London especially delighted him, and that on one occasion he fell on his knees, enraptured at the sight, and thanked God for making it so beautiful. This may be accounted for by remembering that our common furze is entirely confined to Western Europe, and that Linnæus had probably never seen it before, also by the fact that Putney Heath bore some slight resemblance to parts of his native country, especially the upland scenery near Upsala.

The wind-tossed birches and the heather-clad common afforded a great similarity in the landscape.

- “Over the heath the golden gorse is glowing  
And making glad the breeze ;  
And lo ! a traveller, by the wayside going,  
Falls low upon his knees,  
And thanks his God for such a glorious vision,  
And such a rich perfume  
As met him in what seemed a dream Elysian,  
Far from his northern home.
- “So felt the great Linnæus, when before him  
The yellow gorse spread out.  
We may not from his far-off grave restore him,  
With us to roam about ;  
But we may drink in, too, that loving spirit,  
Which made him seek and find,  
Even in the humblest flower that grows, a merit  
Hid from the common mind.
- “And we, like him, in loving faith may linger  
On many a foreign shore,  
Tracing the touch of an Almighty finger  
In plants unknown before ;  
And while the beauty of creation feeling,  
Filled with a new delight,  
Our hearts, before the great Creator kneeling,  
May bless Him for the sight.”





"HE FELL ON HIS KNEES, ENRAPTURED AT THE SIGHT,"

Linnæus bore a letter from the great Boerhaave to Sir Hans Sloane, the accomplished naturalist, collector of natural objects, and afterwards founder of the British Museum.

The letter is still preserved in the archives of that institution. It is written in the strongest language of recommendation, but Sir Hans Sloane received his visitor with suspicion and dislike, treated him with coldness, and finally dismissed him without any expressions of regard.

Oxford was the next place visited by Linnæus, where he paid his respects to the celebrated Dillenius, who was the first botanist of his time. He also received the stranger coldly, so much so, that Linnæus despaired of gaining his friendship, or obtaining from him the plants he so much wanted, and to obtain which he had travelled so far.

At length, on further acquaintance, the coolness was removed, and the two learned men became such fast friends, that, on parting, Dillenius with tears in his eyes begged Linnæus to stay, and even offered to share his salary with him: this he declared would suffice for both. Linnæus' sojourn at Oxford produced great pleasure; but his chief delight was the botanical library, and the glorious Bodleian library, the catalogue of which he ransacked; and eagerly he examined the backs of the books, for the reason stated by Dr. Johnson, that "Knowledge is of two kinds, to know a subject ourselves, or to know where to find it."

Many other parts of England were visited, notably the famous gardens of Chelsea; and an acquaintance was made with Philip Miller, who afterwards became the celebrated gardener to the Society of Apothecaries. These gardens facing the river were the oldest of

their kind in England,—Gerad's garden in Holborn, and Tradescant's at Lambeth having perished.

A second visit was paid to Oxford, where Linnæus was again pressed to remain, but all to no purpose.

Constant study and continued exertion at length affected his health and spirits. He became homesick, and the thoughts of his dear Elizabeth waiting for him in far-off Falun, had too powerful an attraction to allow him longer to remain in England, so by great effort he broke loose from his friends and turned his face homewards. Linnæus returned to Holland, deeply impressed by all he had seen in England, and with the conviction that it was a country well fitted to forward the interests of natural science.

Arriving in Holland he proceeded to Leyden, where he renewed his former acquaintanceships, and started afresh his botanical labours. He pressed on his work, so that he might the sooner be in a position to claim his bride, and his anxiety to reach home daily increased. But he was delayed by the dangerous illness of Boerhaave, for he could not leave the patriarch of natural science on his deathbed. He therefore remained to close the eyes of him whose words had cheered him in his discouragements, whose discernment had placed him on the pedestal he now occupied, who had loved him as a son, and who held him heir to all his scientific attainments.

During the fatal illness, no one was allowed to enter the sick chamber except Linnæus, in whose favour an exception was made. He kissed Boerhaave's hand in token of respect, and Boerhaave raised that of Linnæus to his lips in return. "I have lived out my time," said the venerable physician, "and my days are at an end ; I have done everything in my power. May

God protect thee. What the world required of me it received, but from thee it expects much more. Farewell, my dear Linnæus." Thus ended the career of this great man of science, and with these closing words Boerhaave passed away.

Linnæus felt the loss of his patron and friend very deeply, and became disconsolate and lonely. Very soon he fell ill, but by careful nursing recovered, and started for Sweden. He went by way of Paris, and passed through Antwerp, Mechlin, and Brussels to reach that city. He stayed one month in Paris, visiting the royal gardens in company with the professors and botanists of the city. These were so delighted with their visitor, that they begged him to remain, and offered him a salary to do so ; but he declined their offer, being anxious to see his home again.

Passing through Denmark he reached Helsingfors, and was then on Swedish territory. He hastened onwards, stopping only at Steinbrohult, to seek his father's blessing on his marriage, as well as to tell him all that had happened, the sights he had seen, and the work that he had done. The old man rejoiced with great joy, and took great interest in his son's extensive knowledge. The whole family gathered round to see the young doctor,—the man of European fame in science. The neighbours also shared the common joy, for was not Linnæus a pride to them likewise? But he could not stay ; his heart was in Dalecarlia, his love awaited him there.

He hastened to meet Elizabeth. Four years had passed away since last they met. Three had been stipulated for. The object of his affections was longing for his return.

Linnæus found that, though all was right, the

friend to whom he had entrusted his correspondence during his long absence had been trying to win the maiden for himself. However, "all's well that ends well"; the lovers were again united, and past sorrows were soon forgotten. Elizabeth felt happy and secure, and rallied her lover after the manner of Portia, that he "bought his doublet in Germany, his hose in Holland, his bonnet in Harderwyk, and his behaviour"—

"From home and polished it in France."

He finished the sentence with a kiss.

"And your manners of some Frenchman, who had worn them out, and cast them off," she replied.

With suchlike quiet banter the days passed, happy and serene. "Come to me, beautiful rose of the northern forest!" was now Linnæus' constant cry, "I who refused to enfasten the roots of my floating existence now only ask to be tied."

They were at length formally betrothed, but Linnæus was to secure a livelihood before they could marry, as papa worshipped the "almighty dollar," though it was stamped in copper. So after a short rest he repaired to Stockholm, to commence the practice of medicine, keeping as near Upsala University as possible. Here troubles began anew. He records: "Being unknown to everybody, people were unwilling to trust their lives in my hands; nay, they hesitated to allow me one of their dogs. Abroad, I had been honoured in every place; but in my own country I was looked upon with distrust; no one cared how many sleepless nights and toilsome days I passed. Had I not been in love I would have left Sweden and gone abroad."

After a time a fortunate cure effected by him,

brought speedy popularity. "No invalid could now recover without my assistance. I was busy from four in the morning till late in the evening ; nor were my nights left undisturbed."

Nothing succeeds like success. Linnæus' practice increased to such an extent, that he alone had as much as all the other physicians collectively ; and from this time he was in receipt of no less than nine thousand copper dollars annually, equal to £250.

He was now chosen a member of the Upsala Academy, and at the request of the king, through his tutor, Count Tessin, gave public lectures on botany and mineralogy.

"The sun broke out upon me. I emerged from obscurity—obtained access to the great, and every unfavourable prestige vanished."

Then the rising botanist claimed his bride, and Dr. Moræus yielded his consent. On June 26th, 1739, Linnæus was married to Sara Elizabeth Moræus, at the country house of her father, near Falun. Their engagement had lasted five years.

"Life is quite a different thing by the side of a beloved wife, than what it is to be forsaken and alone, even in summer. Beautiful nature ! I now for the first time fully enjoy it, live in it. The world again clothes me in poetic forms ; old feelings are again awakening in my breast. . . . Fate has conquered the difficulties for me ; it has, I may say, forced me to the mark. From the future I expect everything."

So wrote Linnæus, and it would be pleasant to believe that he "lived happily ever after." But most of his biographers declare that this was not quite the case with Linnæus.

His wife is described as a domestic tyrant, though

he himself never said so. He does not dwell upon the subject ; but speaks of her as just the wife needful for him. If she was unamiable, perhaps there were extenuating circumstances. "Gey ill to live wi'," even as Sir Thomas the Good, of the Ingoldsby Legend, was a trial to Lady Jane ; and we all know what Mrs. Carlyle had to put up with from the philosopher. Linnæus tried all manner of experiments and nostrums at home, many of which he called "economical notions." Scientific men have a way of expanding themselves all over the premises until there is no space fit to use, or left to sit down upon. Those who visited the husband for the sake of science, were apt to construe into domestic tyranny the necessary household regulations, without which there would have been no comfort in the house at all. Anyway, Linnæus was satisfied, so we may suppose he was happy.

Linnæus was, as we have said, in practice at Stockholm as a physician, when he married. He then spent some time at Sveden and Falun, after which he went to Upsala, and finally returned to Stockholm to resume his duties. The exploration of Öland and Gothland followed ; then came the professorship at Upsala, to which place Linnæus and family removed in September 1741.

Linnæus was now a rich man, and he bought an estate at Hammarby, and another at Söfja. His own note book, written in 1762, says Linnæus built a house at Hammarby, so that his children might have a place of abode. His son Carl kept the official residence in Upsala. So he built Hammarby, and set it in a garden. Linnæus' Hammarby, as it is still called, is a group of three wooden houses painted red, with white doors, shutters, and sash bars, set round a small square garden

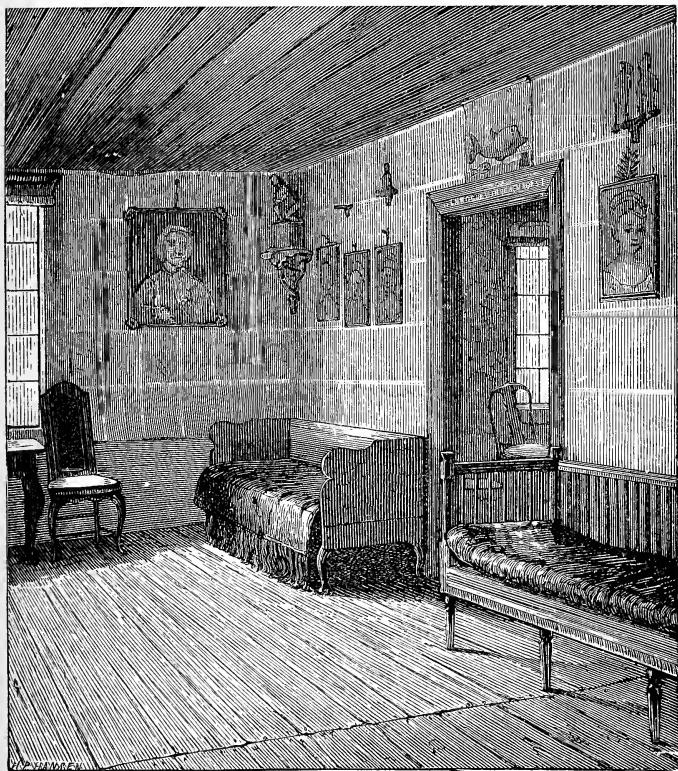
plot facing the south. The horse chestnut (*not a sweet chestnut as is said by some*) standing just before the door of the dwelling-house, is said to have been planted by the great botanist himself. The three wooden buildings stand at right angles to each other, the central or dwelling-house facing south is the largest ; the others, one of which formerly contained the greater part of his collections, look like outhouses or stables now that they are dismantled. The interior—the study—shows the homely furniture, portrait of himself, and one of his daughters, various natural history specimens, and in the angle of the room is a bracket with a gilt Venus and other statuettes, at that time, doubtless, the pride of the family. On each side of the window is a portrait—on the left Dr. Moræus, and on the right, Count Tessin. The saloon opens upon Linnæus' bedroom. The museum is built on the hilly ground behind the house, and is known as the "Museum Hammarybense." It is a kind of summer-house of one room, with oval-topped windows, wooden door of herring-bone pattern, and a pyramidal shingle roof with a ball on the top. Here it was that Linnæus could find quiet, and it relieved the house of the burden of scientific study.

So the last twenty years of his life were set, as it were, in a "background of calm," and during each summer he laid aside the gown of the professor and rambled through the forest or tended his flowers. If he had no actual garden, he soon made a paradise spring up about him ; before all things he was a gardener. "Better a cowslip with a root than a prize carnation without one," was always his feeling ; and the fact that he cared for each individual flower, protecting it from insects by planting camomile near



it, showed that Linnæus was, as Fuller has quaintly said, "a very corpulent man, but spiritually minded."

Many were the visitors to Hammarby, and their enjoyment was great; the host received the learned



LINNÆUS' ROOM AT HAMMARBY.

professor as well as the humble student—both alike were welcome. He even entertained the King of Sweden, and the visit was eminently satisfactory to both. High and low enjoyed their sojourn at

Hammarby. The mingling of deep learning with country pleasures, and the company of the four pretty and lively daughters were indeed charming.

It appears from the records that the museum was nearly destroyed by fire. But no definite information can be obtained of this calamity beyond an expression in the diary of thankfulness to God who protected them all from fire, and a letter from a friend, dated March 1767, who writes : " I feel the distress you must be under with the fire. I am glad, next to your own and family's safety, that you have saved your papers and books."

As we have stated Linnæus was now a rich man ; but he said, " Once I had plants and no money ; now what is money without plants ? "

Soon the desire of his heart was granted, for he was made Professor of Botany at Upsala University ; also superintendent of the Botanical Garden.

His fame grew rapidly. He published in 1745 his " Flora Suecica," and a year later his " Fauna Suecica," being a full description of Swedish plants and animals. His lectures also, by their enthusiasm and eloquence, brought listeners from all parts of Europe. The number of students in the University grew from five hundred to fifteen hundred ; men coming from America to attend his lectures.

Most of the scientific societies of Europe made him a member. After his works were published a gold medal was struck in his honour, and in 1746 the king made him Dean of the College of Physicians. He was next made a noble, and took as his motto the following quotation from Virgil : *Famam extendere factis* (to lengthen out one's fame by deeds), adorning his crest with a small flower that he discovered in his poverty—

this, however, is contradicted by some. He was made Rector of the University, which caused him to think of the contrast between his present prosperity and the time when he could only obtain a chance meal, and was compelled to mend his shoes with paper.

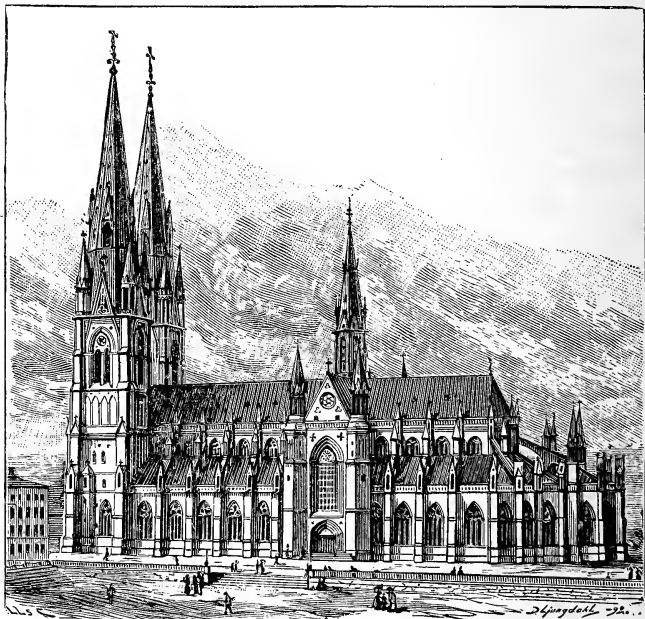
Some would have us believe that biography diminishes in interest when the subject of it has won celebrity, when there comes a lull; when ambition is at home in its own element its course is said to be uninteresting. It is not so, however, in the case of Linnæus. He was one that no amount of success could spoil, for he would go on the more ardently working. It is as though he had climbed the hill for the purpose of firing the beacon that shall kindle answering fires on all the hilltops round, passing on the tale of glory the wide world over.

But alas! the end came, as come it will. After several strokes of paralysis, when he could no longer walk, he was accustomed to be carried into his museum to look long and earnestly at his treasure. Then his memory failed him, so that he even forgot his own name. At last, death came to him one day as he lay quietly sleeping; it seemed but as the folding of the perfect flower, which closes its petals when its time for expansion is over, to become a fragrant memory, full of sweetness and grace, as enduring as the immortal beauty of which it formed a part.

So died Carl Linnæus on January 10th, 1778, aged seventy years, seven months, and seven days, with the whole Swedish nation to guard his good name.

His remains were interred in Upsala Cathedral, and the funeral procession was composed of members of the whole University, the pall being supported by sixteen doctors of medicine, all of whom had been

his pupils. A general mourning took place, and the king, Gustavus III., ordered a medal to be struck expressive of the public loss. One side of the medal exhibits the bust of the great naturalist, with his name: the reverse shows Cybele in an attitude of



UPSALA CATHEDRAL, THE RESTING-PLACE OF LINNÆUS.

grief, holding in her left hand a key, surrounded by animals and plants.

The monument to Linnæus in the great cathedral, is in the Bauér Chapel adjoining the north aisle. It consists of a pyramid of red porphyry from the Elfdal, which had for so long engaged his attention and research in his Dalecarlian tour. It bears a bronze portrait medallion by Sergel, with a Latin inscription



THE MONUMENT TO LINNÆUS AT STOCKHOLM.

and the date. The remains, however, of the great naturalist, repose under the organ loft at the western end of the cathedral; where a plain slab of the

pavement bears the inscription, and also records the death of his wife, who survived him for many years.

But his works are his best monument, and his glory is a cathedral of his own erecting. "He avoided that common error of building his own fame on the ruin of another man."

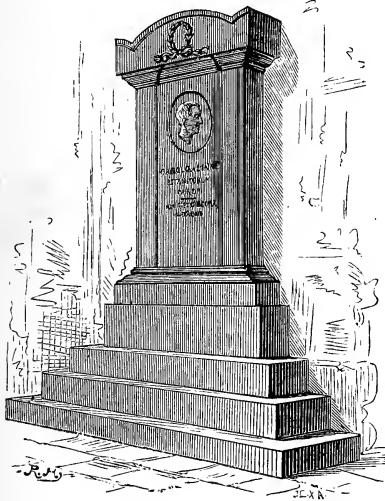
The great system for which he is so justly famous, and which bears his name, is founded upon the number, situation, and proportion of the stamens and pistils of flowers. It divides the vegetable world into twenty-four classes, distinguished by their stamens, and these classes are again divided into orders which are generally marked by the number of pistils.

This system was the most perfect that had as yet been offered, and the surprise and delight of naturalists, who found classification thus easily simplified, at once brought it into popular favour. It had, of course, many imperfections, which were regretted by none more than by Linnæus himself; and he never spoke of it as a perfected system, but always considered it as leading towards truer ways of classification.

The idea which Linnæus made use of was not original with him, for it was hinted at by more than one old Greek; but it had lain dormant in the minds of naturalists for centuries. Linnæus was the first to think of using it as a basis for his system of classification, so that it must be for ever associated with his name. This system is looked upon as an artificial system, because it merely furnishes a convenient method for finding the name and place of a plant, without regard to its relationship.

The natural system, which is based upon the relationship of one family of plants to another, in due time superseded the Linneæan system, which now owes

its chief interest to the fact that it was the first classification which made it possible to reduce the study of botany to a science ; and its establishment led to the development of the natural system, which Linnæus himself declared to be the only true way of classifying, and which his system had embraced in part.

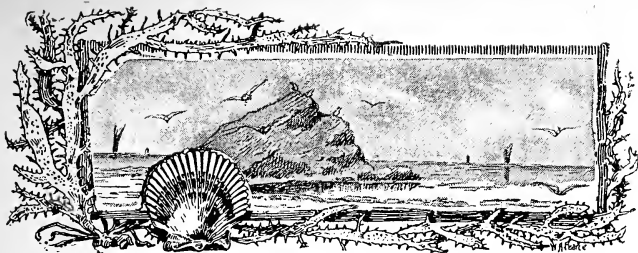


LINNÆUS' GRAVE.



THOMAS EDWARD.





## II

### THOMAS EDWARD.

“Is there one whom difficulties dishearten—who bends to the storm? He can do little. Is there one who WILL conquer? That kind of man never fails.”—JOHN HUNTER.

IT has been well said that the battle of life must necessarily be fought uphill; and to win it without a struggle were to win it without honour. If there were no difficulties, there would be no success; if there were nothing to struggle for, there would be nothing to achieve.

The subject of this brief memoir encountered difficulties of no mean order; the battle of life was fierce and long, but with a determination to conquer he went on year after year, by cheerful, honest working and energetic effort, resolving to make the most of small means and common opportunities.

Thomas Edward was born on the 25th December, 1814. His father John Edward, a native of Kettle in Fifeshire, and a hand-loom weaver, was a private in the militia, and had been stationed with his regiment in Aberdeenshire, where he married Margaret Mitchell a native of that city. The regiment afterwards moved to Gosport, where Thomas was born.

At the close of the great war with France, the

Fifeshire Militia returned home, and John Edward, with his wife and family, went to live at his native place. His wife did not, however, like the ways of the people of the village, which caused Edward to remove to Aberdeen. The house in which he lived was at the foot of the Rennies Wynd, near Hadden's wool mill.

How he became a naturalist, he himself said he could never tell, and when asked, he replied, "I suppose it must have originated in the same internal impulse which prompted me to catch flies at the window." This impulse, which stimulated the unconscious babe to get at the first living creatures he had ever seen, at length grew in the man to an irresistible and unconquerable passion, and engendered in him an insatiable longing for, and an earnest desire to be always amongst, the works of nature. This was the only reason he could give for becoming a lover of nature.

On one occasion when he was asked, "What made you a naturalist?" he said, "I was completely dumfounded! I had no notion that a naturalist could be made. What! make a naturalist as you would a mechanic! I could not believe that folks became naturalists for pecuniary motives. My answer to those who put the question invariably was, and still is, 'I cannot tell.' I never knew of any external circumstances that had anything to do with engendering in my mind the never-ceasing love which I felt for the universal works of the Almighty; so that the real cause must be looked for elsewhere."

As soon as the boy could walk he quickly made friends with the cats and dogs of the household, and on getting out of doors he desired to cultivate the acquaintance of the fowls, but this desire was not easy of accomplishment, as they always ran away before he

could reach them. Close to the old city of Aberdeen were the Inches—the green Inches covered with waving algæ and other seaside plants. Between these Inches were channels, through which the tide flowed; and in these, bandies, eels, crabs, and worms were found in abundance. Not far from the Inches, the manure from the town was deposited; this proved a happy hunting-ground for beetles, rats, small birds, and all kinds of flies and other insects, while in the adjacent ponds were found leeches, powets (tadpoles), frogs, and such-like creatures.

It was here that the boy spent most of his time, and daily caught and conveyed home such “venomous beasts” as took his fancy, much to the horror of his family and the neighbours round. The fishes and birds were easily kept in their several bottles and cages, but the leeches, frogs, and rats were more difficult to confine; they usually escaped, and were unwelcome visitors at the neighbouring houses. This caused several complaints to be made, for, to the poor and ignorant villagers, all and sundry were styled “venomous.”

The boy was punished again and again, talked to by his mother, preached at by his father, and threatened by the neighbours; but all to no purpose. His collections time after time were dispersed or destroyed, but as often as this was done, a fresh supply was brought, as the boy’s hunting ground was exceedingly prolific, and he was an assiduous and persevering collector; and very soon he brought home as many “beasties” as ever. Thomas was again lectured, beaten, confined to the house, and threatened with all manner of punishments, but all without avail; for, watching his opportunity, he prosecuted his searchings until harsher measures were adopted.

One day, for punishment, his mother, having to go out, tied him securely to the leg of the table, at the same time securing his wrists with a cord, telling his younger sister to watch him.

By some means he managed to free his hands, then by great effort, in which he prevailed on his sister to aid and assist, he managed to push the table to the grate, when, putting the rope between the bars, he burnt it asunder and was free. At this juncture his mother was heard approaching. Tom fled, but in his haste he had forgotten to quench one end of the rope, which caused the table to catch fire, and the destruction of the house appeared imminent. By prompt assistance this catastrophe was averted.

On another occasion his father, on going to his work, took with him the boy's clothes, to insure his keeping within the house. His mother dressed him in an old petticoat, which she pinned round his neck, telling him, "that one day at least she would make sure of him." But she had no sooner gone out, than, by tying a bit of string round his middle, he at once proceeded to his old haunts among the frogs and leeches. In the hope of curing his propensity, Thomas was sent to school when little over four years of age; but it would have been as easy for a schoolmaster to change the spots of the leopard, as to eradicate the natural propensity of the boy. Hence it came to pass that Tom was expelled from the school for his devotion to animals. The reason of his expulsion is worthy of mention.

Thomas had somehow got possession of a jackdaw, but it made such a noise, that he was sent out with it one morning, with strict injunction not to bring it back again. He could not part with the bird, so he took it

to school with him. "But how could he hide it!" Little boys' trousers were in those days buttoned over their vest; and as Tom's trousers were pretty wide, he thought he could get Jacky in there. He got it safely into his breeches before he entered school. So far, so good. But when the word came, "Pray," all the little boys and girls knelt down. At this movement Jacky became fractious. He could not accommodate himself to the altered position. But seeing a light overhead he made for it. He projected his beak through the opening between trousers and vest. He pushed his way upwards. Tom squeezed him downwards to where he was before. But this only made the bird furious, and he immediately began to cree-naw! cree-naw! "The Lord preserve's a', fat's a' this now?" cried the schoolmistress, starting to her feet.

The boy was seen with the jackdaw sticking out of his breeches, whereupon he was dragged to the door, thrust out, and forbidden again to enter.

Thomas was sent to Bell's Hill school; afterwards to an academy at Denburn side. From both of these he was expelled because he brought into school insects, and all kinds of obnoxious creatures. He was next sent to Lancaster school, where he remained for eighteen months; but even from this seminary he was expelled, on a charge of having introduced insects. So it was in this way the boy's earlier years were spent.

In the course of one of his rambles he came across a byke (bees' nest) sticking upon a tree. Now a byke was looked upon as a glorious find, not only for the sake of the honey, but by reason of the fun of skelping out the bees. Thomas began to take it from the under side of the branch to which it was attached, when a bee lit upon one of his fingers and stung him

severely. This was hard to bear; he sucked it and blew upon it to relieve the pain, but with little success. What was he to do? He could not leave such a treasure, and notwithstanding the attacks of the bees, he would not go without it. Yet he had nothing to defend himself with, or anything to put the byke into when he had taken it down. His bonnet would scarcely suit. It was small and full of holes. His stockings would not do. A thought struck him. There was his shirt! That would be just the thing. So he quickly disrobed himself of this garment. He very carefully approached the tree, and contrived to remove the byke and to tuck it up in his shirt, fastening it into a round knot, so as to keep all in that were in. He managed to get it home, and to secrete his treasure in an old pot, ate his supper, and went to bed. But though trying to escape observation during the process of undressing, he was unsuccessful, for his brother caught sight of his nudity and called out, "Mither, Tam hasna' gotten on his sark!" which on examination was found to be correct. Questioned by his father, and threatened with the strap, he was compelled to state that the missing garment was in the hole on the stair.

"Go and get it, and bring it here immediately," demanded his father.

Tom went and brought it sorrowfully, for he dreaded the issue.

"And what have you got in it?"

"A yellow bumbees' byke."

"A what?" exclaimed his father and mother in a breath.

"A yellow bumbees' byke."

"Did I not tell you not to bring any more of these

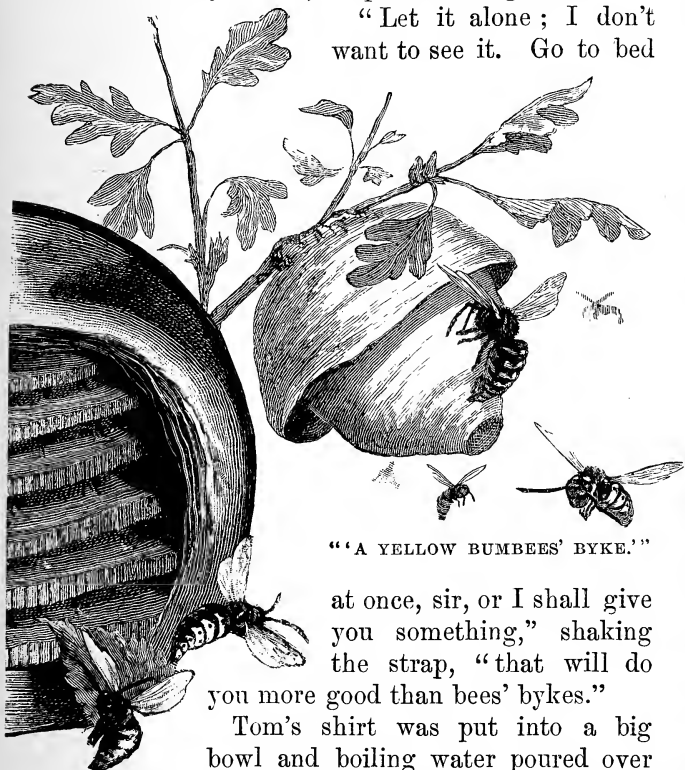
things into the house, and you promised not to do so?" said his father.

"But this is a new one," said Tom; "it's made o' paper."

"Made of fiddlesticks!"

"Na; I'll let ye see it," replied the eager boy.

"Let it alone; I don't want to see it. Go to bed



"‘A YELLOW BUMBEES’ BYKE.’"

at once, sir, or I shall give you something," shaking the strap, "that will do you more good than bees' bykes."

Tom's shirt was put into a big bowl and boiling water poured over it, and after it was cold they opened the shirt and found—a wasp's nest.

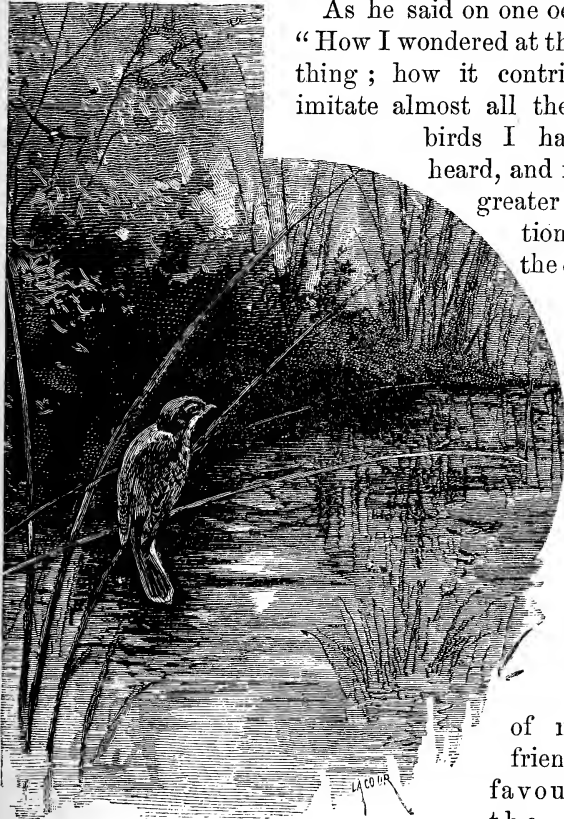
Discouraged by his experience of school life, and being always chastised at home, Tom was very willing

for a change so that he might be able freely to follow out his inclinations; so, when it was suggested that he should go to work he eagerly hailed the proposal. At about the age of six years he was, therefore, sent to a tobacco factory, where his brother, two years his senior, was already working. Employment was found for the lad at the princely weekly wage of fourteen pence. This factory belonged to Messrs. Craig and Johnson, and the spinning was done in an old house at the end of the flour mill in St. Nicholas Street. Each spinner had three boys under him—the wheeler, the pointer, and the stripper. Thomas stayed two years, and went through all these grades. He next moved to the factory at Grandholm, on the river Don, two miles from Aberdeen, where, by working from six in the morning until eight in the evening, he was able to earn about five shillings per week. This change gave great displeasure to his father and mother, though they were pleased at the increase of wages; they considered the distance, as well as the work, to be too much for so young a boy.

It was not altogether the increase of wages that led Thomas to make the change. It was the prospect of the charming walk through the old woods night and morning, where he would be able to follow out his searchings, and collecting of the various living creatures that he was sure to find; and this walk each morning—starting at the early hour of four—proved to be a delight, as the factory was situated in the centre of a beautiful valley, almost shut in by tall and luxuriant hedges of hawthorns, water courses, and shadowy trees, with large woods and plantations beyond. It literally teemed with life. What nests, what insects, wild-flowers, and plants! the like of



which he had as yet never seen. Prominent amongst the birds was the Sedge Warbler, which lay concealed in the copse, or by the margin of the mill stream.



THE SEDGE WARBLER.

As he said on one occasion,  
 “How I wondered at the little  
 thing ; how it contrived to  
 imitate almost all the other  
 birds I had ever  
 heard, and none to  
 greater perfec-  
 tion than  
 the chirrup

of my old  
 friend and  
 favourite—  
 the spar-  
 row.”

One day he saw a kingfisher,—this was a great event in his life. He describes it. “What a beautiful bird ! What a sparkling gem of nature ! Resplendent in plumage, and gorgeous in colour—from

the bright turquoise-blue to the deepest green, and the darker shades of copper and gold. I was greatly charmed with its extraordinary beauty, and much excited by seeing it dive into the stream. I thought it would drown itself, or that its feathers would become so clogged with water that it would be unable to fly. Had this happened, my intention was to have plunged in to the rescue, and of course claim the prize as a reward. Thus buoyed up, I wandered up and down the river bank until the shades of evening came on, and compelled me to give up the search."

During two years this life was to the boy a pleasure, as he enjoyed the early morning, the song of the birds, the rambles in the plantations and woods, and by the sides of the river and streams; and he often said in later years, in speaking of his factory life, "It was a happy time for me whilst I remained there." But the father thought that the boys should be taught some settled trade, so the eldest was apprenticed to a baker, and Thomas bound to a shoemaker, one Charles Begg, who had a shop in the Gallowgate. His trade consisted in manufacturing ladies' and children's boots and shoes, the particular branch being known as pump-making. This apprenticeship was fixed for six years, wages commencing with eighteenpence per week, rising sixpence each year. The hours extended from six o'clock in the morning till nine at night. Begg, though a good workman, was exceedingly intemperate and passionate, and as Edward still continued his love for his "beasties," his master, one day finding that he had brought three young moles to the shop, killed them at once, and seizing Edward, thrust him out of the shop into the street.

On another occasion Edward had finished his work,

waiting the return of his master in order to go to dinner. He was sitting with a sparrow on his knee, one which the lad had trained and taught a number of tricks. It was his pet, and he loved it dearly. His master returned partly intoxicated. Striking the boy to the floor, the bird fluttered to the ground and was immediately trampled on. The boy rose, avoiding the blows of his master, picked up his pet, which was still breathing, put it in his bosom, and hastened home. On seeing him his mother exclaimed,—

“What’s the matter wi’ ye? Your face is bleeding and ye ha’e been greetin’ (crying)!”

“Look!” said he, taking the now lifeless bird from his breast and holding it up; “that would gar onybody greet” (cry); and his tears fell on the mangled body of his pet. “I would not have cared for myself if he had only spared my bird.”

After three years spent with this drunken shoemaker things came to a crisis. His master went from bad to worse, for in his drunken fits he abused and thrashed his apprentice, until the boy could stand it no longer and resolved to run away. He tried to get to sea, and mentioned the subject to his parents, but they refused to consent. So not being able to get away by water, he determined to do so by land.

He had often heard speak of his uncle living at Kettle, so he determined to make the journey, thinking perhaps that his relative might be able to help him to get better employment than shoemaking.

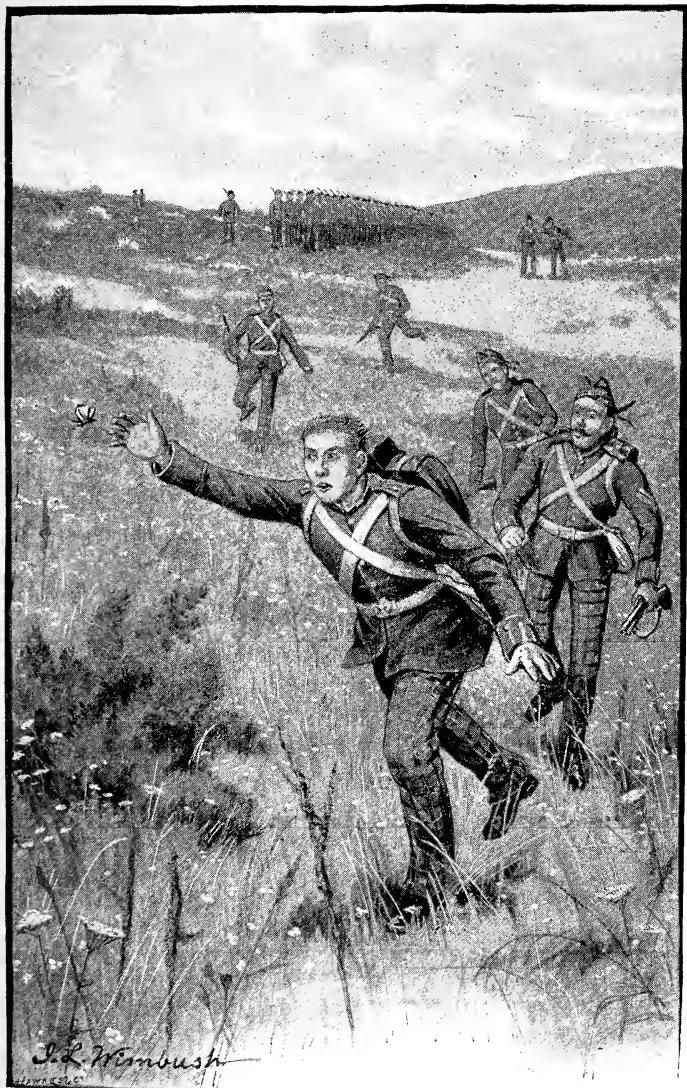
But difficulties presented themselves. The village of Kettle is situated in the centre of Fife country, one hundred miles from Aberdeen, and the road was unknown to the boy. Then again, he had no money; all his earnings had gone into the family purse, and

been used for family needs. However, he obtained sixpence from his mother, and he took two loaves of bread with a small quantity of oatmeal and started on his long journey. But alas! he needed sevenpence. It required sixpence to enable him to cross the Tay at Dunkeld, and the penny was needed to cross the Bridge of Montrose. However, he got the penny by selling his knife. So passing through Stonehaven, Bervie, Montrose, Arbroath, Dundee—crossing the Firth of Tay, Newport was reached, then Cupar, and finally the village of Kettle, where he soon found his uncle. But the reception he met with was by no means a cordial one. The uncle thought that perhaps the lad had done some mischief, and run from home for the purpose of hiding.

However, he gave the lad some supper and sent him to bed. Next morning, his uncle gave him his breakfast with a large piece of bread and eighteen pence. This amount, to him, was abundance. Not being able to accomplish anything by the help of his uncle, Edward resolved to return home, and after many adventures he arrived at Aberdeen with sixpence, which he had carefully kept for the purpose of repaying his mother. He reached the house one morning at breakfast time, after having been absent one week.

He was now forced to submit to a severe scolding from his mother, who urged him to go back to his trade, for he was far better at work “than stravaign (wandering) about the country like an evil doer.”

So after trying again to get to sea and failing, he resolved to resume his old occupation—not with his former master, but with a man in Shoe Lane, who was willing to engage him. But after working for two months trade became slack; he then obtained



THOMAS EDWARD LEAVES THE RANKS TO CHASE A BUTTERFLY.

employment in a shop on the Lime Quay, but here again work soon failed; the men were paid off, and Edward was once more out of employment.

His attention was next directed to emigration, for at that time America was much thought of and continually discussed. Trade was bad throughout the country, and Aberdeen shared in the general depression. Edward had no money, but he thought to get away as a stowaway on board of an emigrant ship then about to sail. But just on the vessel leaving port he was discovered, when he leaped from the ship to the shore and returned home defeated and mortified. He, however, was fortunate in obtaining occasional employment, until the Militia was called out in 1831, when he enlisted, and took pleasure in the various exercises. There is little doubt that the drill was of great service to him in strengthening his constitution.

His love for natural objects still continued. When the company was being drilled on the links (sandy wastes) one bright sunny afternoon, a large brown butterfly (a fritillary) flitted past. Edward saw it. He had never seen the like before. Without thinking he flew after it, among the sand hillocks; grasping it with his hand, it eluded him. Again he rushed after it, losing his bonnet in the chase, when suddenly he was gripped by the neck. He looked round, and saw that it was the corporal of his company, with four men behind him.

Looking at Edward, the corporal said, "What's up, Edward?"

"Nothing."

"The deuce!"

"No; it wasn't that; it was a splendid butterfly."

"A butter-devil!"

"No, no ; it was a butterfly."

"Stuff !" said the corporal ; "are you mad ?"

"No, I don't think I am."

"You look like a madman ; and I'll tell you what it is, you'll have to pay for this !"

"For what ?"

"For breaking away from the ranks while at drill."

And away they marched, two militia men before, two behind, Edward and the corporal in the centre.

The occurrence was witnessed by some ladies, friends of the officers, who inquired into the matter ; and finding the offence was a small one, Edward was reprimanded and sent back to the ranks. This was his first and last military transgression, and he served out his time with attention and diligence.

Not liking to go back to his trade, and preferring military life, he enlisted in the 60th Rifles. This coming to the knowledge of his mother, who strongly opposed it, arrangements were made to get him off, which were successful ; and so ended the military career of Thomas Edward.

In 1834, at the age of twenty, he left Aberdeen to settle in Banff, where he found employment with Mr. Abercromby, in whose service he remained for twenty-three years.

He was, no doubt, induced to stay, from the fact that Banff was a small place, from which he had easy access to the country he so dearly loved. Further, his inclination to remain was strengthened by his falling in love with a maiden—Sophia Reed by name—who subsequently became his wife, and proved to him all through life a veritable treasure.

Mrs. Edward was in every way a helpmeet, and

from his marriage he began the real and earnest study of natural history ; but, as was the case in other matters, Edward had to begin at the very beginning. He knew little or nothing of books. He did not possess a single volume, or even know the names of the birds and animals he caught.

He knew little of the nature and habits of the creatures he went to seek ; he scarcely knew where or how to find them. Yet, his very want of knowledge proved a source of inexhaustible pleasure to him. All that he learnt of the form, habits, and characteristics of birds and animals, was obtained by his own personal observation. His knowledge had been gathered and accumulated by himself. It was his own.

He felt keenly his want of education. Although he had attended several schools before he was six years of age, he had not learned much from his teachers, who knew but little themselves, and doubtless taught less. He could only read with difficulty. Arithmetic was to him a thing unknown. He had not even learnt to write.

As to his marriage—many thought he acted imprudently in taking upon himself responsibilities, when his earnings were so small and precarious ; but it proved that he married wisely, and to this important step in life he owed much of his ultimate success. His marriage settled him, and his wife being bright and cheerful, was always ready to welcome him from his wanderings, and withal took a lively interest in his pursuits. He speaks of her as his “fortune.” Being of industrious habits, as well as a fine seamstress, the young wife, of her own accord, soon learned boot and shoe binding—work which was at that time done by hand. She not only did all the binding for her



husband, but she often bound for others, and this work she continued for many years.

Astonishing as it may appear, the fact is undeniable, that Mrs. Edward had only about this time seven shillings a week from her spouse, the remainder of his earnings being left in the hands of the master, to be drawn at the end of each term, as was the custom.

This small amount was all the wife had, with the little she earned herself, for about fifteen years. The family was large, being no fewer than eleven in number—ten daughters and one son. All were brought up to maturity in health and vigour, and though they had only one apartment which served the threefold purpose—parlour, bedroom, and kitchen—with a little recess called a closet, and a small garret, the house was a picture of cleanliness, everything being kept and done methodically. She had a place for everything, and kept everything in its place. It is necessary to dwell somewhat at length on the admirable character of Mrs. Edward, in order to understand how her husband was able to devote so much of his time to the pursuit of the studies in which he took so much delight. So anxious was she to further her husband's views, that many times she spent most—sometimes all—she earned in purchasing wood, glass, and paint for cases, so that the objects of his investigations might not be injured.

With a wife thus helpful, Edward was able to pursue his studies in natural science. He very soon accumulated a valuable collection of objects, illustrating the natural history of the district. His operations were carried on between the close of his work at nine o'clock and the hour for commencing work next morning—six o'clock.

There is little doubt he weakened his constitution at this time, but he was greatly assisted by his strictly temperate habits. He worked incessantly, and filled up every half hour, and by dint of persevering and persistent labour, succeeded in getting together a large and valuable collection of insects, numbering in all nine hundred and sixteen specimens, in twenty cases. But having placed these cases in the garret before they were glazed, he found in a short time that the insects had all been destroyed by mice. This represented the loss of four years' labour. Nothing daunted, however, he recommenced, gradually refilling his cases and adding to his stores.

During the years named, and before 1840, Edward collected over two thousand geological specimens, which were carefully preserved and fixed in cases nearly three hundred in number. These were all made by his own hand, his only tools being a saw, his shoemaker's knife, hammer, and awl. They were neatly arranged and prepared, and had glass fronts ; the whole work being the handicraft of this votary of science.

But the result of all this labour did not add to his pecuniary resources. He frequently exhibited his collection at the markets in town. On one occasion he opened his exhibition at Brandon during the yearly fair, held in May 1845. He hired a room at the Trades Hall, and invited the general public to visit his "Collection of preserved animals, comprising quadrupeds, birds, fishes, insects, shells, eggs, and other curiosities"—thus ran the notice. He was fortunate enough to obtain a mention in the local paper, in the shape of a paragraph calling the attention of the public to the exhibition then opened, "that the collection of the rare and beautiful objects were

the result of Mr. Edward's untiring effort and ingenuity, without aid, under discouraging circumstances which very few would have successfully encountered . . . our young friends especially should visit the exhibition ; it will both amuse and instruct them. They will learn more from seeing in half an hour, than from reading in half a year."

This wonderful exhibition took the people by surprise. His neighbours could never understand his wanderings by night at all seasons of the year ; but this display was an eye-opener to them, and his mysterious journeys were at last explained. Some people could not believe what their eyes saw, they called at his dwelling to ask if it were all true.

"True," he exclaimed, and pointed to his cases of birds and animals, which nearly filled his house.

In preparing for this exhibition the specimens were brushed up and the cases cleaned. In doing this he found he had again sustained a serious loss. Some time previously he had placed two thousand dried plants in a box, which he carefully stored away. This collection had cost him eight years of labour. He now found that it had become the resting-place for numerous cats, who had resorted thither on many occasions. The plants were completely soaked, and were worthless. This was a serious loss. At length his exhibition was ready. Held in an upper room at the Hall, many visited it, and the result was that the receipts proved sufficient to pay expenses, and to afford a small balance for future needs. .

Another exhibition followed, held at the same place, the following year, which was even more successful, and even excited general admiration ; but in an evil hour he was advised to take his collection to Aberdeen

and exhibit in that city. The transport thither—in 1846, before the days of railways—was not cheap, but it was argued that, as Aberdeen contained a large and intelligent population, two universities with professors and students, besides others learned in science and literature, success could not but be ensured.

Edward was thus persuaded, and even he was sanguine; and after an enormous amount of labour the precious collection left Banff in six carriers' carts, accompanied by the entire family—himself, wife, and five children—on July 31st, 1846. A shop was taken in Union Street, at twenty shillings per week. This street is the finest in Aberdeen; in fact, it is the representative street of the granite city.

Handbills and advertisements appeared stating "that the objects comprising the collection had been collected in the counties of Banff and Aberdeen, and preserved by a single individual—a journeyman shoemaker." The notice went on to induce the public to see for themselves, as a visit was absolutely necessary to afford any idea of the extent of the labour involved. "The ocean, rocky shore, sandy beach, meadows, cultivated fields, whinny, knowes, and woods; the running brooks, stagnant pools, muddy and unsavoury ditches, marshy flats; old walls, ruined towers, and heath-clad hills, have all been visited and anxiously searched in order to procure the objects which compose the collection." The terms were, Ladies and Gentlemen, sixpence; Tradespeople, threepence; Children, half-price.

But the charmer, in the guise of advertisement, "though he charmed never so wisely," failed to attract. A few persons dropped in, but the receipts were miserable, while the expenses were heavy.

Those who did come had monstrosities for sale, or sought to consult Edward about the ailments of their pets. Very few knew anything about natural history, and cared less. He was severely let alone, alike by professors and students of the University of the City of Aberdeen. But among the few who visited the exhibition was Dr. Macgillivray, professor of Natural History, and lecturer on Botany at Marischal College. He was exceedingly pleased with what he saw, and much interested in the work and labours of the humble shoemaker. The professor sympathised with his lack of success, and told him that the people of Aberdeen were not prepared for such an exhibition, there being no museum in the city, no collection of natural objects, no library—in fact, nothing for the enlightenment of the higher and nobler faculties of man! And it was to this cause that the exhibition proved a failure. Several others also came, and said Edward had lived several centuries too soon.

An effort was at last made to get the “masses” to visit the exhibition, by lowering the price of admission to one penny; but the masses held aloof and would have none of it. The weeks followed until the close was at hand, and on almost the last day, when no money had been taken, Edward received a letter containing bad news, which caused him to sink into despair. His wife and five children depended upon him, he was deep in debt, for which, if not discharged, his collection would be seized, and he was now threatened with the loss of work: ruin stared him in the face.

Brooding upon his condition, he rushed down to the shore, and for four hours his memory remained a blank. Arriving on the sands, he divested himself of sundry articles of dress before plunging into the

sea in order to end life's misery. He was, however, attracted by a flock of sanderlings, among which was a strange bird larger and darker than its fellows, and following this flock from point to point, in order to discover the stranger, he was saved. He forgot all his misery in his intense love of Nature. He considered afterwards that the bird had been his Providence.

So after thinking over matters, refusing to be in debt, he was forced to succumb; and in order to save himself and meet the expenses he had incurred, he sold the entire collection for twenty pounds, ten shillings. After paying all his debts he had barely sufficient to enable him to return home. In this way went the result of ten years' labour. He walked the whole of the distance home, and reached Banff penniless, leaving his wife and family in the great city until he could raise the means to bring them back. After some little time this was accomplished, the home was re-established, the old habits of nightly explorations were resumed, and the work of collecting again commenced. After his exhibitions at Banff and Aberdeen, Edward became a general referee for all natural objects found in the district, and he became an authority on many matters of science.

Several friends urged him to extend his investigations into Aberdeen and Elgin, but, though they strongly advised him to go, did not offer to help.

Considering that he had now eight in family and his weekly earnings were but sixteen shillings, to range the shires of Aberdeen, Banff, and Elgin, and at the same time maintain his family, was altogether an impossibility. Yet gradually, as he was able, he extended his investigations farther into Banffshire and even into Aberdeenshire. For this purpose, he obtained

a certificate drawn up by the clerk of the Peace and signed by sixteen justices, to enable him to go over the country with his gun in search of birds and animals.

This certificate is a curious and interesting document, describing the personal appearance of Edward, and giving official contradiction to the insinuation that he was in the habit of poaching.

“This is to certify, that the bearer, Thomas Edward, shoemaker, who is in height about five feet six inches, has dark hair and eyes, much pock-pitted, round shoulders, and about thirty-five years of age—is, in addition to his other calling engaged in collecting and preserving natural objects which relate to Ornithology (birds), Oology (eggs), Entomology (insects), Helminthology (worms, etc.), and Conchology (shells); that for the purpose of procuring Ornithological specimens, he is under the necessity of carrying a gun, but in doing so, we, the undersigned, have never heard of a single case of poaching being brought against him, and, so far as we know, he is not in the habit of killing game of any sort, nor of destroying property of any description, which, were he in the practice of so doing, being so frequently out with his gun, he could not, we think, have escaped public notice so long—having resided in this town for a period of sixteen years, during which time he has borne an unimpeachable character.

“JAMES DUFF, J.P., etc., etc., etc.

“BANFF, *March 1850.*”

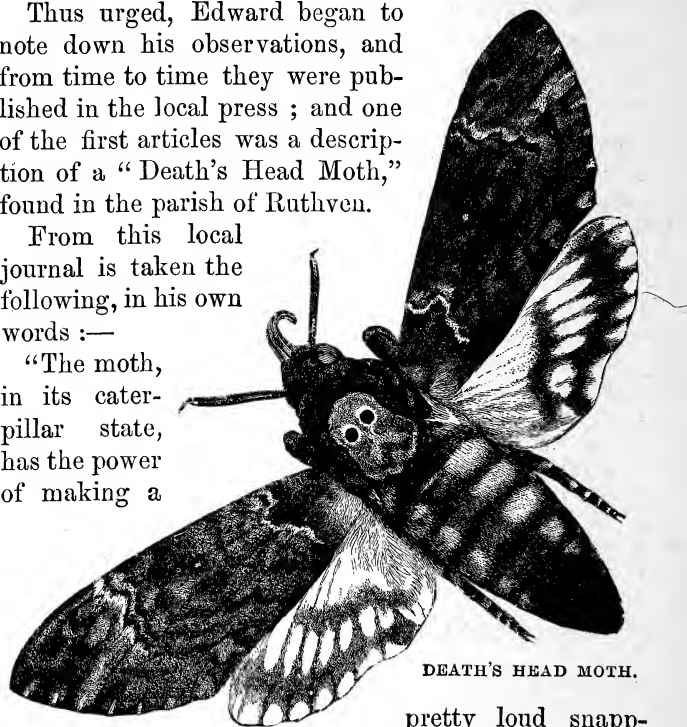
About this time Edward commenced a correspondence with his old and much-esteemed friend, the Rev. James Smith, of Monquihitter, ten miles from Banff, who lent him a few books on natural history, and who urged him to note down the facts which came under his notice, and also to publish the result of his investigations. This surprised Edward. “Why,” said he, “I cannot write for the publishers.” “You must learn to do so,” said Mr. Smith, “and in order to write you must study grammar. It is a duty you owe to society,

to write down all you learn respecting the objects you collect, and it will be very selfish on your part, if you do not publish the result of your investigations."

Thus urged, Edward began to note down his observations, and from time to time they were published in the local press ; and one of the first articles was a description of a "Death's Head Moth," found in the parish of Ruthven.

From this local journal is taken the following, in his own words :—

"The moth, in its caterpillar state, has the power of making a



DEATH'S HEAD MOTH.

pretty loud snapping noise, which has been compared by some to a series of electric sparks. The chrysalis squeaks, more particularly when about to change. And, as to the perfect insect itself, it is gifted with a voice and the power of modulating it with pleasure, being sometimes of a plaintive nature, then mournful, then like the moaning of a child, then again like the squeaking of a mouse. This, together



with the fact that it carries on its back—that part called the thorax—an impression of the front view of a human skull, hence its name of Death's Head, has made it an object of the greatest terror and dislike among the ignorant and superstitious. . . . It is said to be the largest we have, and is, in fact, the largest inhabiting Europe, save the Peacock Moth. Be this as it may, it is a very large insect, measuring from five to six inches across the wings, and having



PEACOCK BUTTERFLY.

a body proportionately long and thick. The caterpillar, which is smooth, is of a greenish-yellow colour, with minute black dots all over, and with seven or eight bluish stripes on the sides ; it has a horn above the tail, and is likewise very large, being, when fully grown, about six inches in length. It feeds on the potato, the deadly nightshade, the jasmine, and other plants of as dissimilar a nature.”—*Banffshire Journal*.

A peacock butterfly was caught in Duff House garden, near Banff ; though common in England, it

is very rare in Scotland. Our great authorities make no mention of its ever having been seen in the North. In some places these insects have been mistaken for locusts. This led Edward to write an article on the subject, which duly appeared.

A friend discovered four saw-flies in a piece of a fir-tree as it was being cut for burning. He showed it to Edward and it formed the subject of an article describing his own investigations.

“They are called saw-flies from the fact that the female possesses an instrument by which she perforates, or rather saws, holes in trees into which she drops her eggs. From this it will be seen that the larvæ are wood-feeders. In this country—Scotland—they are by no means numerous, and it is well that they are not, as our forests would shortly disappear; for in places where they abound, as in Norway, they destroy thousands of trees in a single season. It is the growing, not the dead, wood that they attack. The young grubs, so soon as they emerge from the egg, eat their way into the heart of the wood. In this fashion the tree is either killed, or so injured that it eventually pines and dies. The fly itself has no English name, but is known to entomologists by the term of *Sirex juvencus*.”

Edward pursued his investigations into the habits of the spider, the Herald moth, and the Vapourer moth, all of which were exceedingly interesting, articles appearing from time to time in the local journals which had the marked effect of directing general attention to the observation of natural objects; and in this way, the study of an important branch of science was greatly extended. In the district of Banff, interest was fairly aroused, and Edward was regarded as a general referee.

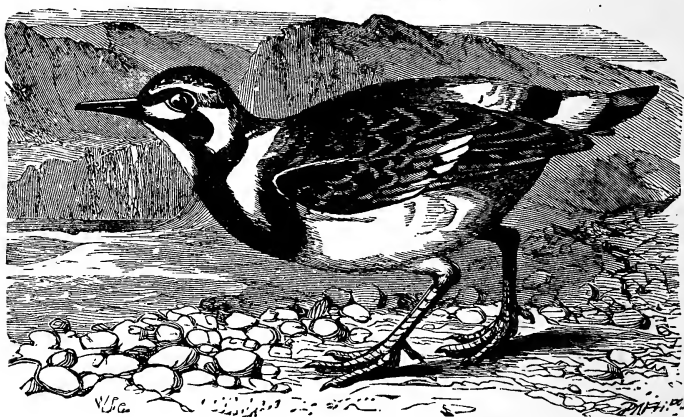
Birds obtained from him a large share of attention, and he was, in conjunction with his friend—the Rev. James Smith—the means of adding considerably to the ornithology of Scotland, by recording the appearance of many birds hitherto unknown to that country. The white stork, Bohemian waxwing, several species of the turnstone or tern, and willow wren were noted. The first appearance in Scotland of the American shrike was duly recorded, and this bird was exhibited at a meeting of naturalists at Aberdeen, at which Professor Macgillivray stated “that it had never been met in Scotland before, nor in all probability in any part of Europe.” The pied flycatcher, also said to be unknown to Scotland up to this date (1849), had also been met with by Edward. The woodlark, the mountain finch, little crake, the spoonbill, bee-eater, black redstart, and many others, which had never been hitherto recorded, were also noted by him.

In describing these various birds, he says : “It is quite possible that they may have visited the country before, but from the neglect—or rather contempt, with which natural science is regarded in northern Scotland—no notice has been taken of them. They may have even bred amongst us unknown and unrecorded. There is plenty of work for naturalists. A great deal has yet to be done in the various branches of natural science, and there is nothing better calculated for that purpose than attentive and intelligent observation.”

On every occasion, Edward exhibited the utmost patience and minuteness of observation. It was not so much his object to *kill* birds as it was to observe their manners and habits. He very often spent so much time in observation that none was left for

writing the results. He complained that the compilers of works on natural history did not care for details of the animals of which they wrote. They rather gloried in the abundance of technical descriptions. These may appear scientific, but they were at the same time exceedingly dry.

His description of the habits of the turnstone, which appeared in the *Zoologist* for April 1851, will give his own idea of how records should be written,



THE TURNSTONE.

in such a way as to engage at once the attention of the unscientific and general reader.

“The Turnstone is a very interesting bird, from its peculiar form and very singular habits. It is a strong thick bird, with rather short stout legs, long expanded toes, and a full broad breast. Its bill is in the form of an elongated cone, strong at the base, on the culmen rather flattened, and with a curve inclining upwards towards the tip. The habits of the bird are singular, more particularly in respect to

the method which it adopts to procure its food, which is, as its name denotes, by turning over stones in search of the insects on which it feeds. If the stone cannot be turned over with the bill, the breast is applied; and the birds are willing to assist each other, in the same way as masons or porters will do in turning over a stone or bale of goods."

In the course of his wandering amongst the rocks, whilst resting after great exertions, he records: "I observed a falcon sailing slowly and steadily along bearing something in its talons. On he came, seemingly unconscious of my presence, and alighted on a ledge only a few yards from where I sat. I now saw that the object he carried was a partridge. Having fairly settled down with his quarry on the rock, I could not help admiring the ease and cool composure with which he held his struggling captive, for it was still alive, until death put an end to its sufferings.

"There was no lacerating with its beak at the body of the poor and unfortunate prisoner, in order, as it were, to hasten its end; no expanding of the wing to maintain its equilibrium; although the dying struggles of the bird caused a general quiver. All being now over, with one foot resting upon its game and the other on the rock, silent and motionless as a statue the captor stood, with an inquiring eye, gazing at the now lifeless form of its prey, seeming to doubt the fact that it was already dead. But there was no mistake; the blood oozed from its wounds—as its body was pierced by the talons of the conqueror—trickled down the sides of the dark cliff, and dyed the rocks in its course.

"Satisfied at last that life was extinct, an incision was then made in the neck of the victim, and into

this the falcon thrust its bill several times, and each time it was withdrawn it was covered with blood. It next wrenched off the head, which was dropped. It then began, not only to pluck, but to skin its food from the neck downwards ; and having bared the breast commenced a hearty meal by separating the flesh into portions with as much apparent ease as if it had been operating with the keenest surgical instrument. I



THE FALCON.

should have liked to have witnesssd the end of the work thus begun ; but unfortunately a slight movement on my part was seen by the quick eye of the falcon, and my nearness discovered. Having gazed at me for a few seconds, with an angry and piercing scowl, it rose uttering a scream so wild and loud as to awaken the echoes of the surrounding rocks ; whilst, with the remains of the feast, it rounded a point of the cliffs and disappeared.

“ I was glad of this unlooked for occurrence, as I had never before witnessed these noble birds in a state of

nature, or while engaged in devouring their prey, and that, too, amongst the rugged fastnesses of their natural retreat."

An amusing account was given by Edward in 1856 as follows :—

"The Bohemian waxwing is an occasional visitor during the winter. One very stormy night the inmates of a house in Gardenstown—a small fishing village eight miles from Banff—were much surprised and startled at hearing, despite the din without, what appeared to them a noise coming from the chimney. They were seated round the fire. What could it be? No one could tell; but all were aghast with affright. The north wind roared, as if it would have roared its last; the sea moaned as if it, too, intended never to be heard again; the hail pelted against the windows with such violence that it seemed intent upon breaking them to pieces. It was indeed a fearful night, and all present crept closer and closer to each other. But still the noise in the lum (chimney) was audible above the roar of the elements. Nearer and nearer it came, and keener and keener grew the consternation within, as the countenance of each grew paler and paler; until at last down it rushed into the very centre of the group, knocking out the light, filling the place with smoke and soot nearly to suffocation, and spreading dismay and fear around. All roared for help, and rushed to hide themselves in any available corner or nook they could find.

"‘Lord, fat is it, Jack?’ shouted one to another, after a pause. ‘As surely the deevil, or some of his legion.’

"‘I dinna ken,’ replied Jack; ‘but the Lord ha’e a care o’ us a’, for I’m likin’ to chock. Open the

door Bell, or I'll dee. I canna get breath. The reek's cutting my throat.'

"'Na,' whispers Bell. 'I'm fearest t' move. Dee 't yersel'.'

"'It's surely the end o' the warld, or fat else can it be?' muttered a third.

"'But I'll be scunviced (choked) alive, if some o' ye dinna open the door or the winnocks (windows),' cried a fourth.

"'O me! O me!' squeaked another. 'I'll be stifled wi' seet (soot), if I get na air. Fat will I dee?'

"Courage, however, at length prevailed, and the door being opened, relief was speedily administered to the suffocating and affrighted inmates.

"A light was then obtained. Judge of their astonishment when, instead of the 'old boy,' they beheld sitting on the edge of the stool the cause of all their trouble, in the shape of a little bird—a stranger that none knew; but which proved to be a Bohemian waxwing."

One of the most vivid descriptions that Edward wrote, was a narrative of a day's adventure on Gamrie Head. This appeared in a local journal. The editor, in introducing it to his readers, said that it resembled a chapter from Audubon or Wilson (both celebrated writers on natural history). This account also appeared in the *Zoologist*.

Edward's greatest pleasure was that of rambling along the seashore, for the purpose of observing the habits of sea birds. The multitudes of various kinds which frequent the Moray Firth are attracted by the shoals of herrings, which afford food, not only for thousands of fishermen, but for millions of



the feathered tribe. It is to this careful watching and close investigation into the habits of our birds, that we owe many an interesting fact in natural history; and it is a great defect in our knowledge that we know so little of the animal creation.

Several times friends endeavoured to obtain for Edward more congenial employment than shoemaking; and one of the positions sought, was in the Natural History collection of King's College, Aberdeen, but this could not be obtained. He became curator of Banff library from 1859 to 1877, the pay being three pounds per annum. He then became sub-curator of Banff Museum, at a salary of two guineas per annum until the year 1866, when it was increased to four guineas. These paltry sums were, however, slightly increased by means of extra work on several occasions. An attempt was also made to obtain employment in the Customs at Wick; but here only temporary work was offered. He next applied to the Royal College of Surgeons, London, for a curatorship; but at that time only a fourth portership was vacant, so he failed there also. He then studied electricity for the purpose of assisting a surgeon in electrifying his patients; but thinking that he might kill more than he could cure, he relinquished the study. Photography next occupied his time, but for want of capital, that also proved a failure; and the last application he made was for an appointment as sub-curator of the City Industrial Museum at Glasgow, but in this he received no encouragement.

So he found after all, that he must really "stick to his last," and continue his old life. He corresponded with many eminent naturalists, and was able to help them in the various branches of science in which they

were individually engaged—Mr. McDonald, of Elgin, as to zoophytes ; Mr. Blackwood, of Aberdeen, as to algæ (sea-weeds) ; Mr. C. Spence Bate, of Plymouth, as to crustacea ; Mr. Couch, of Polperro, as to fish.

Up to this date, Edward had confined his study and investigations to the shore, but now he resolved to extend his observations to the waters. Here he found increasing work in the vast field open before him. The great Moray Firth had never been explored. It abounded with fish, and marine objects upon which fish fed. But at the outset difficulties presented themselves. He had no boat, nor could he obtain the loan of one. Here again Mother Necessity came to his aid, and his inventive power was great. He gathered together all the old pans, pots, pails and kettles that he could procure. These he filled with straw, grass, old clothes, or anything of a like nature. These were his sea traps, and by placing stones in the bottom of the vessels, and attaching ropes, he lowered them into the deep pools along the coast. Some he threw into the sea from the point of a rock fastening the rope to the shore.

In due time, when the traps were pulled up, they were found to contain small fishes, crabs, shellfish, starfish, worms, and sea mice. Collecting all these treasures he replaced his traps for further supplies.

Besides these methods, Edward found that tangle roots were a favourite hiding-place for many species that were beyond the reach of the dredge, and that never entered his traps set along the shore. They were not, however, beyond the power of the elements. But for the tempest that tears them from the rocks, and dashes them on the shore, many rare objects would never be found.

Whenever a storm occurred in the Moray Firth, Edward immediately went out, collected the sea weed that had been driven in, cut off as many of the roots as he could carry with him, and then carefully examined them. He was also assisted by the fishes.

Big fish were the best of dredgers. They fed far out at sea, at depths where dredges could never reach. Fishermen caught them, and brought them into port full of what they had swallowed. Edward begged the contents of their stomachs, and for this purpose sent his daughters to the neighbouring fishing villages; the object of their visits also being to search the fishermen's lines, and to bring away the weed and other specimens that were attached to them.

All this rubbish (as it was called) was carefully examined, and from these searchings were obtained many of his rarest specimens. It is surprising what may be found in this way.

Speaking of the cod-fish, Edward says: "It is to the stomach of this species that I am most indebted for many of the rarest specimens that I possess—small crabs, lobsters of almost every description, shells of every sort (no matter whether inhabited by their original possessor, or by a hermit, are no obstacles to the voracious cod), shrimps, fish, lice, sea mice, sea urchins, with occasionally a starfish, dead men's paps, anemones (no matter to what they may be attached, whether a stone or shell), all are swallowed by this unceremonious fish; the eggs of the dogfish and the skate, with the roe and the ova of other species when deposited in the sea-weed: nothing is lost. Sea cucumbers, jelly fish, feathers, and remains of sea fowl, and on one occasion the skeleton of a partridge with the wings, feet, legs, and head

attached, pieces of pewter and cloth occasionally, and once a cluster of beech-nuts with part of a domestic fowl. As for fish ! the fish does not swim that the cod, when hungry, will not attack and, if successful, swallow. In short, nothing seems to come amiss. But even this outline of the cod's bill of fare does not include all that the animal preys upon and devours. It is enough, however, to show its propensities. The cod is extensively fished along the northern part of Scotland, and may be termed the poor man's salmon. Great numbers are salted and dried, and in that state sent to the southern markets.

"The haddock, like the cod, is extensively taken and largely cured, and also forwarded south. Like the cod, the stomach of this species is also a rich mine for the naturalist."

In order to obtain all these products of the sea, Edward went round among the fishermen from Crovie to Portsoy, and begged them to help him in his researches. He told them that many an object of great interest to naturalists was daily thrown away. Though it might be of no use to them it would prove of value to science.

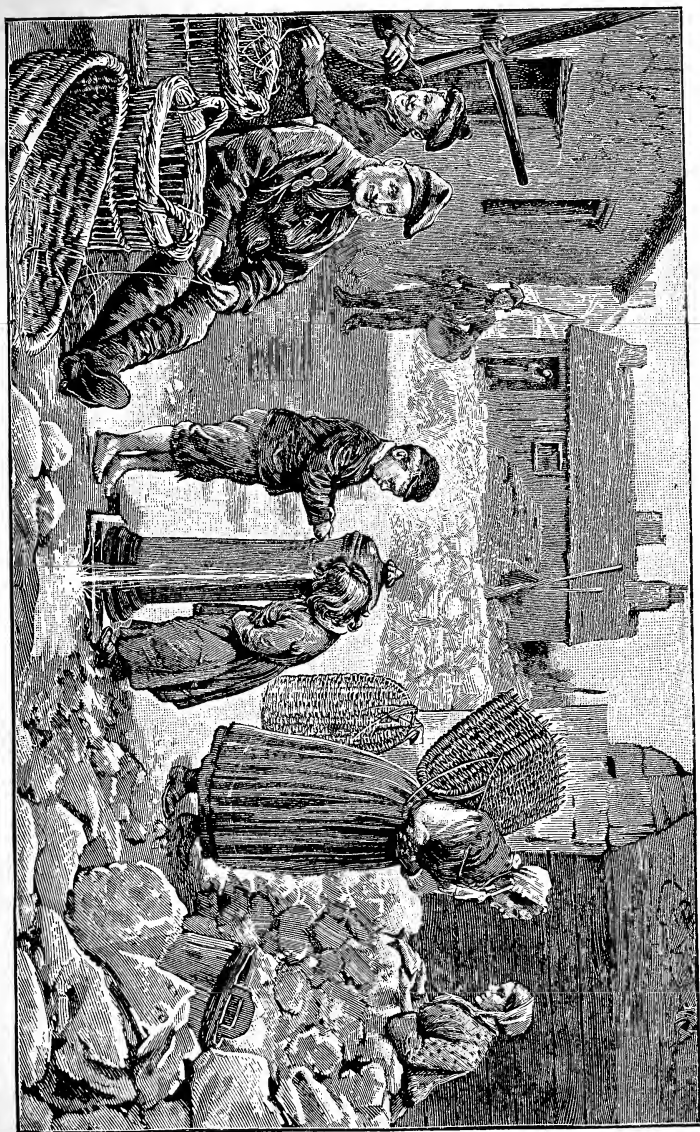
"Oh !" said the fishermen, "we canna tell what the fellow wants ; we get so muckle trash upon our lines. Are we to keep it all ?"

"Yes," replied Edward, "keep it all. Lay it carefully aside, and I will fetch it or send my daughters."

A few of the fishermen did what Edward told them to do, but the others "couldna be fashed."

The ocean is, as it were, one vast and boundless expanse of life, and the inhabitants thereof about as numberless as the sands by the shore. I have myself, and that too under the most disadvantageous

A BANFESHIRE FISHING-VILLAGE.



conditions, picked from a dead valve, nine distinct species of shells, three various kinds of starfish, and five separate sorts of zoophytes, besides worms, and a vast number of other marine creatures. But this is nothing to what is at times to be met with ; yet such things are generally thrown away, for no other purpose than that of being destroyed.

The fishermen of Macduff helped Edward greatly. Amongst the rare fishes caught by them and at once recognised, were the sandsuckers, the small spotted dogfish, the blue striped wrasse—very rare—a specimen of the cuttle-fish, the length of which was four feet, Garrell's blenny, the black goby or rock-fish, the first of its kind ever found in Moray Firth, the needle-fish, also the first of its kind ever found in these waters. These rare fishes were all sent to Mr. Couch of Polperro, who referred to his scientific works and furnished Edward with the names, and all the information concerning them that was then known and recorded.

It was in this way that he obtained his knowledge, for Edward had no books of his own, and very few were within reach.

At one time it was proposed to supply him with books to assist him in his studies, and at a public dinner at Banff a high compliment was paid him by the principal speaker for his devotion to science ; and in conclusion he urged all present to "help Edward by all means possible, but give him no money. I know him, as you all do, to be no drunkard, no idler, but a sober, hard-working man. But I still say, give him no money. Give him *books*. Provide him with the means of reading, and he is just the man to make money for himself."

But alas ! Edward received neither a book nor the means to purchase one, from all his local admirers.

The help he rendered many naturalists can never be fully known ; his correspondents were numerous, and almost daily requests were received. Perhaps his friends forgot—perhaps they never knew—that Edward was a poor, hard-working man, labouring at his trade during the day, with only a few hours in the early morning and a few at night which he was able to employ in their service, and that it was his greatest difficulty to earn sufficient money to maintain his large family. He was often on the brink of starvation, yet he worked for his friends as willingly as though he had been a gentleman of fortune.

When the “History of the Sessile-eyed Crustacea” came out, the help afforded the author by Edward was fully acknowledged, as may be seen by a perusal of this valuable and interesting book.

The discovery of new or rare species in the northern district was entirely the work of Edward, and his investigations were so carefully conducted as to be of extreme value to naturalists generally.

To give an idea of the work involved, and to show the wonderful industry of the man in his researches among the Crustaceans (crabs, crayfish, and lobsters), it may only be mentioned, that of two hundred and ninety-four, found in Moray Firth, no fewer than twenty-six new species were added by Edward himself.

His investigations among the starfishes were of great value. Some of his observations were published in the local journals as well as in the *Zoologist*, many of them being new to science. This could not have been otherwise, for it was his habit first to observe and then to kill. He never had any mercenary

object in view, his desire was to obtain knowledge ; and what he observed he told as plainly and clearly as he could, without knowing whether his observations had been printed before or not. He only regretted that he had so little time to publish his descriptions of the habits of animals and fishes that came under his notice.

The researches of Edward for new fishes were extensive and of the greatest value. The celebrated work of Mr. Jonathan Couch, of Polperro, on "The History of British Fishes," owes much to the labours and investigations of our northern naturalist.

But about the beginning of the year 1868 Edward was compelled to abandon his work. He became a victim to his old complaints, fever and sore throat, the result of exposure and insufficient sustenance, and for some time he was laid aside ; the old man's fine constitution conquered and he finally recovered, but never to be again as of yore. He was forced to learn the truth that, so far as further researches into the mysteries of nature went, his career was at an end. He had lost the elasticity of manhood and never recovered it. But though he could not now wander over nature's domain as was his wont, the activity of his mind and the closeness of his observations would not allow him to remain at rest. He had done what he could, and that nobly, for science. But there were other things that might be thought over and written about. One of these was the antiquities of Banff, and he at once began preparing notes on the town and neighbourhood. He commenced with the history of the ancient cross, and that more interesting piece of antiquity, the kitchen midden at Boyndie. Kitchen middens, or refuse heaps, have been discovered in large numbers along the shores of the Danish islands.



They consist of castaway shells of the oyster, mussel, cockle, and periwinkle, intermixed with the bones of quadrupeds, birds, and fish. Some of them also contain fragments of pottery, burnt clay, and rude implements of stone and bone, which have evidently been dropped by those who took their meals in the vicinity of the heaps. From these remains it is clear that some pre-historic people were accustomed to live along the shore, or to frequent it when food failed them in the interior.

Who these ancient people were has been the subject of much conjecture. Discoveries had been made in Denmark, and, when published in this country, investigations began as to the existence of similar mounds on our Island, and those found on the shores of the Moray Firth are the first of which we have any detailed account. This heap at Boyndie, near Banff, engaged the attention of Edward, and resulted in a correspondence with scientific men in all parts of the country.

Edward says, "We cannot come to any other conclusion than that the kitchen middens must be of a very remote age. We know nothing of the people who formed these mounds of shells and bones. Tradition and history are altogether silent. Archæology seems powerless to help us, and ethnology's vision fails to penetrate the depths of obscurity. It would appear to be one of those mysteries of the past which baffles even the wisest."

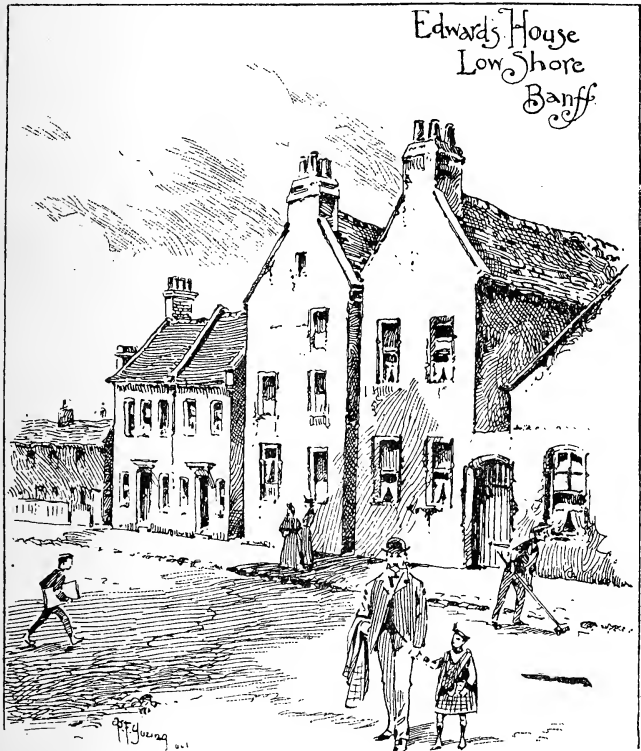
But the labours of Edward were drawing to a close. He had fought the fight for science, inch by inch, until he could fight no longer. He had also fought the fight of honest poverty; for even towards the end of his life he could only earn eight shillings per week. But he had always lived within his means

so that he was in no man's debt. As to his work on behalf of natural science, its value can never be estimated, and the number of new species generally that he accumulated and investigated during his thirty years of incessant toil, cannot be reckoned, for he never kept a log; but some idea may be formed by a perusal of the list of the Banffshire Fauna.

Edward himself, on looking back upon his labours, was surprised that, in the midst of his difficulties—his want of learning, time, and books—he was able to accomplish even the little he did. His only reply to those who wondered with him was, “I had the will to do the little that I have accomplished, and any one having the mind and will need not stick fast, even in this world. He may not shine so much as if he were polished and better educated, but he need not sink into the mire altogether.”

So after again vainly endeavouring to obtain employment in other ways than shoemaking, he said in June 1875: “As a last and only remaining source I betook myself to my old and time-honoured friend,—a friend of fifty years standing, who has never yet forsaken me, nor refused help to my body when weary, nor rest to my limbs when tired—my well-worn cobbler's stool. And here I am still, on the old boards, doing what little I can with the aid of my well-worn kit, to maintain myself and my family, with the certainty that instead of my getting the better of lapstone and leather, they will very soon get the better of me. And although I am like a beast tethered to his pasturage, with a portion of my faculties impaired, I can still appreciate and admire as much as ever the beauties and wonders of nature, as exhibited in the incomparable works of our adorable Creator.”

But the end was approaching, and one of earth's noblest sons was about to leave us ; and the whole scientific world would become the poorer for his absence. Edward had been ailing for some time, so



that a change of air and scene were considered necessary. He removed to Duff town, where he remained for some months ; but even during this sojourn he was out daily in the prosecution of his study of the botany of the district, especially the mosses.

He frequently got wet, and often came home soaked to the skin. A severe cold was the result, which on his return to Banff assumed the form of congestion of the lungs, and he was soon confined to his bed with an acute stage of this complaint. It was, however, overcome, but the attack left a weakness which could not be surmounted. This kept him within the house during the winter of 1885. The incessant labour and toil of years, with the exposure to all weathers, as well as the many privations endured in the past, had accomplished their work on the once strong constitution; weakness followed weakness, and in the early spring he was conscious that the end was approaching. He gradually sank, and owing to failure of the heart's action, Thomas Edward passed away in the early morning hours of May 27th, 1886.

On the Friday following his death he was laid to rest in the little cemetery at Banff.

All grades of society strove to do him honour. The Provost, members of council, officials of the town and county, scientific men from far and near, friends from a distance—all came to drop the sympathetic tear. Ministers, merchants, bankers, assembled to pay their last respects to the honoured dead, while the wreaths sent were numerous and beautiful.

A simple service was conducted, the last duties performed, and the chapter closed over a life well spent. The coffin bore the simple inscription,—

“THOMAS EDWARD, AGED 71 YEARS.”

The record of Edward's life shows that he was emphatically a worker. His mind was never more active than in his later years. He loved to sit and write, which he would do for hours together. His

mental faculties were never at rest, and he was never less alone than when alone, paradoxical as it may appear.

“His mind to him a kingdom *was*.”

With a little more education in early life, and more leisure in maturer years, he would have produced greater results. Circumstanced as he was, however, his resolute will overcame immense obstacles, and his name must ever hold an honourable place among the distinguished votaries of science.

He once addressed the boys of a large school in Liverpool, and though his remarks were somewhat rough they are nevertheless interesting. He said: “It is now, as perhaps you know, acknowledged that I, a poor unlettered shoemaker, have done a great thing, perhaps something wonderful. Well, if this is the case—if *I* have been able to do anything marvellous, or the least out of the common way, this I must say—there is not one in this room who need despair of doing something very much greater. There now, that is encouragement for you; is it not? None need despair—especially you, for you are favoured. It is my firm conviction that there is no one but what could do the little I have done if he only *would*. It’s there where the grand secret lies—the *will*, the will to do and win.

“But, remember, that even the little that I have accomplished required diligence, perseverance, and punctuality. If I wished to do anything I did it. Whenever I set myself, and appointed the time, to do work I went. The day did not dawn nor the night fall, however stormy, that kept me back. This was well known, not only to my own household,

but to the people of the district. Do the same, dear boys, and rest assured that your reward will follow, sooner or later, come what may. Persevere in whatever you undertake; carry it through; don't stand hesitating; moments once past are beyond recall, only the present is ours. Take time by the forelock, as my folks said I did; then I have no fear of you. Keep this ever in your minds, that *no idler* ever did anything but evil; and though perhaps some of you may never be compelled to work for your daily bread, you must labour otherwise. We are told in the very best of books that we were all made to work,—had it not been expressly for our advantage, that truth would never have been recorded. It is not *necessary* that we should live here; but living, it is absolutely requisite for our very existence that we should do *something*. How much better it is to labour, even if only for our own amusement, than to be simply idlers! Now, in becoming workers, I need hardly tell you that it is neither possible nor desirable that all should labour in the same way, or for the same end. The more individual or original that work may be, so much the better. To every one God has given a talent; and whatever that talent may be, don't hide it in the earth, for it will not grow there. Na! na! loons, ye mauna dee that! if you value yourselves, ye mauna dee that. You must improve it, for you will be called upon by the Giver to restore it with interest; and every talent, mind ye, is capable of much improvement; it'll grow—it'll do something, if you have only the *will* to make it.

“ You would do well to study and emulate whatever is praiseworthy in the good and great who have lived before you; for the paths to honour and fame are as

varied as they are inviting. Choose for yourselves, and in making your choice some of you may become naturalists. . . .

“In searching for living creatures my desire has been, not to destroy for destruction’s sake, but simply that I might learn all I could concerning the beautiful and wonderful works of God. This to me was hard though pleasant work. I was very poor indeed. I had no books, nor the means to purchase any. I had none to teach me nor to advise me, nor to tell me a word of that which I longed to know. Some of you may ask, ‘How did you work?’ Well, I had the will and I persevered, for I was never idle.”

In conclusion Mr. Edward said: “My young friends, do, I entreat of you, take the solemn warning of an old man, and one who speaks from sad experience; never neglect your education or any opportunity for gaining knowledge. Of all my misfortunes put together, and they were surely many, the want of education has vexed and grieved me most, and must continually do so until I depart hence.

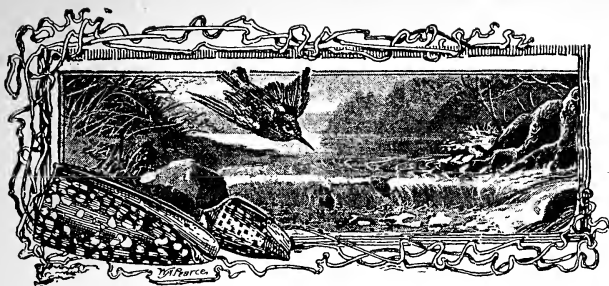
“Take my warning, and forget not my words. Be wise, have a respect for yourselves; you will then be respected by others. Be kind to every living creature; help one another—in every good work; be obedient to your parents and to all who care for you, and above all, wheresoever you go or whatever you do, never forget your great Creator.”

This address was most cordially received, and all who heard it were braced up and animated in mind and spirit. The lessons inculcated—of the dignity of work and the value of perseverance—were long remembered, and in several cases gave colour to many lives of those who were then in school.



GEORGE CUVIER.





### III.

## GEORGE CUVIER.

“Rich are the diligent, who can command  
Time, nature’s stock ! and could his hour-glass fall,  
Would, as for seed of stars, stoop for the sand,  
And, by incessant labour, gather all.”

D’AVENANT.

“NO page of human history is so instructive and significant as the record of those early influences which develop the character and direct the lives of the eminent.” Thus spake Garfield, the American President.

This is especially true as to the subject of our sketch ; for the study of a book turned the whole course of Cuvier’s life, and made him famous in natural science.

The year 1769 was a memorable one, for in it Napoleon Bonaparte was born ; the man who made as great a revolution in the political world as Cuvier did in the scientific, though not equally so enduring.

George Léopold Chretien Frédéric Dagobert Cuvier first saw the light on August 23rd, at the little town of Montbéliard in the department of Doubs, France. In a beautiful country, on the banks of the river Allar, the town is surrounded by vineyards,—just the kind

of cradle in which a naturalist might be nurtured. The town, though now belonging to France, at that time was part of Wurtemberg. The Cuvier family came originally from a village of the Jura, which still bears the name of Cuvier. The removal took place at the time of the Reformation.

The father of George entered a Swiss regiment then in the service of France, and so distinguished himself in the army, that he was made Chevalier de l'ordre du merite Militaire, and after forty years' service, retired on a small pension to Montbéliard, where he received the appointment of commandant of the artillery. It was not until he had reached the age of fifty years, that he married a highly accomplished lady, considerably younger than himself, by whom he had three sons. The eldest son died, and George was so feeble, that it was only by the tender and loving care of his mother that his life was preserved. To him she devoted herself, and this devotion left an impression upon the boy that was never effaced; and to his latest years he cherished every circumstance connected with her memory. He loved to recall her kindness, and to dwell upon objects, however trifling, which reminded him of her.

His mother was a good woman, and exerted influences over her boy which helped to shape his future career. Not only did she care for his health, but she sought to train his mind, and to guide him in his religious duties. As he afterwards said, it was to his mother that he owed all his success. She taught him to read, and aided him to form those habits of keen observation and diligent study which served him so well in after life.

Every morning she took him to an elementary school and, although herself ignorant of Latin, so

scrupulously made him repeat his lessons to her, that he was always prepared with his tasks, by reason of which he held a high position among his fellows. His mother also made him draw under her own guidance, and fostered a love for reading ; furnishing



BUFFON.

him so far as she was able with the best of books on history and general literature.

Naturally inclined to study, this care and attention nurtured the passion, and increased that ardent desire

for knowledge, which became the principal spring of his intellectual existence.

At the age of ten years, he was placed in a high school called a *Gymnase*, where for four years he studied Latin, Greek, history, geography, and mathematics, never tiring of the latter; and by the means of his well-trained memory, made the driest facts of history easily learnt. His fondness for reading increased so much that his mother had to take away his books and force him to seek exercise and recreation.

As he studied, so he played—well; for the boy threw into his various occupations his heart and soul. This characteristic he bore out in his life.

It was whilst he was at the *Gymnase* that his taste for natural history was acquired, by the sight of a book written by Gesner, the great Swiss naturalist, with coloured illustrations. This fascinated him, and the liking was increased by his finding at the house of a friend the complete works of Buffon, who in his own brilliant and poetic style wrote thirty-six volumes describing the wonders of the animal kingdom. The boy read and re-read the glowing descriptions, copying them, and drawing the various figures, colouring them with paint according to the printed description, and when his water-colours gave out employing pieces of silk to denote the wings of his birds and butterflies. Whenever possible he had a volume of Buffon in his pocket, and being possessed with a good memory, he very easily retained what he read; so that at the age of twelve years he was perfectly familiar with quadrupeds and birds, and was far advanced in the study of natural history.

At the age of fourteen—the last year of his sojourn at the *Gymnase*—he formed a small society among the

school boys; fixing the meetings for every Thursday at a stated hour, and constituting himself president. He directed that some book on natural history, philosophy, or travel, should be read, after which the merits of the work were discussed, and when all had spoken, he would, as president, sum up the whole and pronounce judgment, with which, of course, his followers entirely agreed. In this way he trained himself to speak in public, and by this means very soon became a tolerably fluent speaker. This served him in good stead, for on the anniversary fête of the Duke of Wurtemberg, he composed and delivered an oration suitable to the occasion, to the astonishment of his audience.

But his work at the Gymnase was soon to close. The family were poor, and had only a small pension as income. So after a family council had been held, it was decided that George should enter the free school at Tübingen and prepare for the Church. But a misfortune happened. His master disliked the boy from some cause, and was mean enough to try to change his destiny by placing his composition, or theme, in the third rank, although meriting a place in the first. This low standard would affect his position in the college at Tübingen; so that, in disgust, and feeling disheartened, he gave up all thoughts of college, to which he much desired to go in order to pursue his studies. In this way he was lost to the Church, but saved for science.

The prospects of the lad seemed to be overclouded, and, for a time, his future undecided. But it so happened that his case came to the knowledge of Duke Charles, through the princess, his sister-in-law. George was sent for and examined; and so satisfied was the duke with what he had seen and heard, that

he at once declared his intention of taking the lad under his special care, sending him to the University of Stuttgart, so as to enter his own academy—the Academie Caroline. He was then only fourteen, but in consequence of his early training, both at home and at the Gymnase, he was able with ease to take his place among the most celebrated of the students of the Academy. This was his first time of leaving the parental roof, and he mentions this memorable journey as being a most miserable one. He travelled to Stuttgart, sitting between the chamberlain and the secretary of the duke, both being strangers to him, who conversed in German to each other the whole of the way, taking no notice whatever of their little charge, who quietly brooded over the last good-bye of his darling mother. No wonder that he remembered it during later years.

However, the city was reached, and on May 4th, 1784, George was entered as a student of the University of Stuttgart. Here he made rapid advances, and during the course of four years he studied mathematics, law, administration, medicine, etc.

After applying himself for one year to philosophy, as his particular subject, he chose the study of administration, which in Germany embraces the practical and elementary parts of law, finance, police, agriculture, etc. He was principally led to this preference because it afforded him many opportunities of studying natural history, and of visiting collections and museums.

Nine months after arriving at the Academy, he won the prize for excellence in the German language, and on this account received the order of Chevalerie, which was an order given to but few students out of the four hundred belonging to the University.

This honour entitled the holder to dine at a separate table, besides conferring many advantages under the immediate sanction of the duke.

Life now assumed a pleasanter aspect; for those by whom he was surrounded soon recognised his talents, and his various tutors helped him in many ways, so that those talents might develop and grow.

But although he followed up his college studies, and excelled in them, it was the after hours that he so much enjoyed, and which were used to profit.

He was not slow to turn his great advantages to the best use—the museum, the opportunities for field rambles, and country walks, and lastly, the splendid library to which he had access, in which he found the works of the great Linnæus, and other celebrated naturalists, whose books he read over and over again; acting the part of the true student by comparing their descriptions with the natural objects themselves, so far as he was able to do, at the same time using his pencil freely, illustrating in detail the text of his favourite authors.

In his walks he collected a considerable herbarium, which soon became famous throughout the University; his specimens of plants included many that had hitherto been unknown to exist near Stuttgart. His drawings of birds and insects became the admiration of all; and in order to ensure correctness and fidelity, he kept in his room numbers of living creatures, so that by watching their habits he daily learnt new facts that were then unknown, and which served him to good purpose in after years.

By reason of his studies, at the close of his career at Stuttgart he was promised a place in the administration of the state; but owing to the financial condition of the country, he did not succeed in obtaining the

desired position; in consequence of which some way had to be devised as a means of gaining a livelihood.

Here again clouds appeared. As years before he was lost to the Church, so now he was lost to the state. Owing to the condition of France, and the unsettled state of money, the small pension of his father was withheld, and it became absolutely necessary for the young man to cease being a burden to his family. He gave up all hope of political distinction, and resolved to take whatever might offer, so long as it provided a means of gaining an honest livelihood. This was quite against his own wishes, as well as the desires of his patron, the duke.

The position of tutor to a French Protestant family residing at Caen, in Normandy, was offered him, which he gladly accepted, much to the regret of his friends and companions, who considered that his already acquired honours, his extraordinary talents and great attainments, fitted him for a more exalted position.

But here again it proved that the circumstance which at first appeared as a misfortune really became a stepping-stone to future fame and success. Without, therefore, bewailing his lot, at the age of nineteen he settled down, in July 1788, as tutor to an only son in the family of Count d'Hericy at Caen.

Though young in years, Cuvier possessed a variety and depth of knowledge which very soon ripened him into a great *savant*, and a love of labour, a depth of reflection, a perseverance and an uprightness of character from which he never swerved.

This sojourn on the borders of the sea induced him to study marine animals; but, as he was without books, he confined himself to the objects more immediately within his reach. The casual dissection of a calamer—



a species of cuttle-fish—led him to study the anatomy of Mollusca (shell-fish), which again afterwards led to his great classification of the whole animal kingdom.

It was thus from an obscure corner of Normandy that the voice was first heard, which, in a comparatively short space of time, filled the whole scientific world with admiration; which was to lay before mankind so many of the hidden wonders of creation, to discover to us the relics of former ages, and to change the entire face of natural history.

Cuvier at this time, also, began the study of the class called Vermes, or worms, in which class Linnæus had included a vast number of lower animals, and which Lamarck, the great naturalist, had subsequently investigated. These were examined by Cuvier, and arranged according to their resemblance in structure. This was excellent work, and, as he himself said, “was done for the purpose of self-instruction, not for fame.”

At the little town of Valmont, a small society was formed, and held its meetings for the purpose of discussing agricultural topics. At this period was the Reign of Terror, and the famous Abbé Tessier, so persecuted in Paris, had sought refuge at Valmont under the disguise of surgeon to the regiment stationed in that town.

Being a scientist, he attended the meetings of the society, and derived much pleasure therefrom; but having been in his palmy days a voluminous writer, his books were familiar to Cuvier, who, being present on one occasion, noticed the great similarity of the surgeon's remarks to those of the Abbé's writings, and came at once to the conclusion that they were one and the same. He inadvertently addressed the speaker as L'Abbé. This at first gave great alarm, so much so, that L'Abbé exclaimed,—

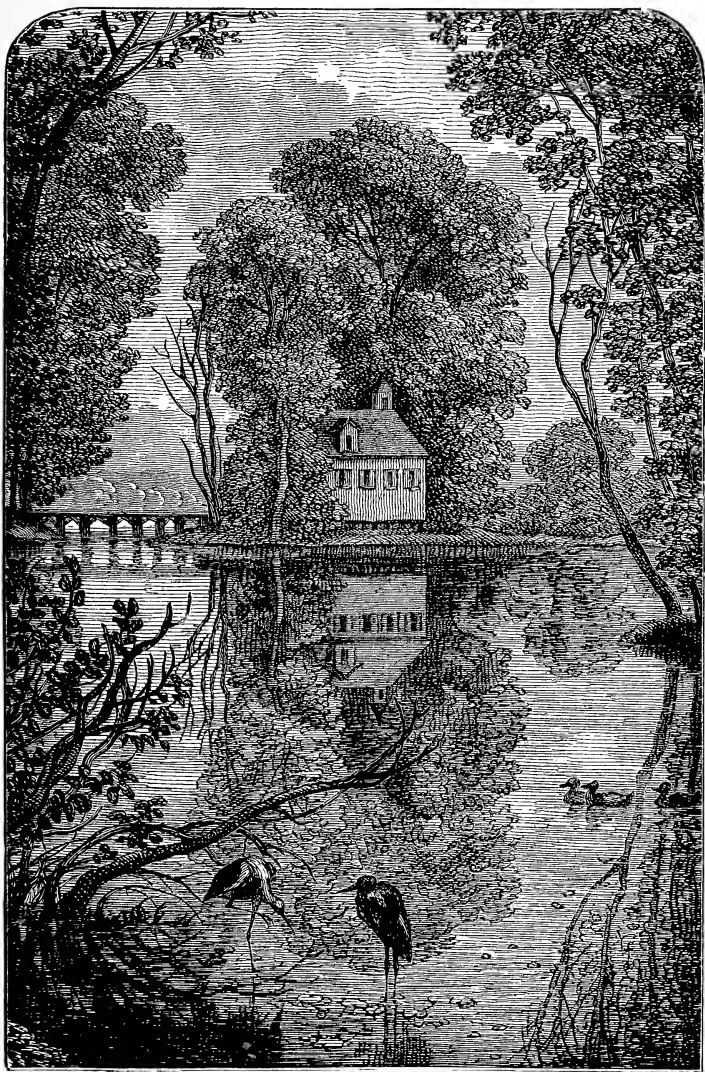
"I am known, then, and consequently am lost."

"Lost!" replied Cuvier. "Nay, you are henceforth the object of our most anxious care."

The two became fast friends, and by this friendship Cuvier obtained introductions to many noted men, which obtained for him the *entrée* into scientific society.

In a letter to a friend, the Abbé wrote: "M. Cuvier is a violet, which was concealed among common herbs. I doubt your finding a more able person for comparative anatomy, for he demonstrates with much clearness and method. He is a pearl worthy of being gathered by you. Help me to draw M. Cuvier from his retreat; he is made for science and for the world."

It was through the influence of these friends that Cuvier was invited to Paris, where great efforts were being put forth to re-establish the literary institutions which had been overthrown by the Revolution. In the year 1795 he arrived in Paris, and was very soon appointed Membre de la Commission des Arts, and shortly afterwards, professor of the central school of the Panthéon. Then followed the appointment at the Jardin des Plantes, so that at the age of twenty-six Cuvier found himself following in the line of the great naturalists, such as Daubenton, Buffon, Lamarck, and others who had filled the same position. Cuvier was thus settled for life in the very position he so much desired; for, although called the garden of plants, a grand museum of comparative anatomy of animals was destined to rise under the guidance of Cuvier. He sent for his aged father, then nearly eighty years of age, also his brother, to make their home with him. His joy would have been complete had his precious mother been among the number; but alas! she had passed away without seeing or hearing of the



JARDIN DES PLANTES,

fame of her boy, although doubtless she was convinced of his ultimate success and greatness, and was comforted by the prospect.

In 1796 the National Institute was formed, Cuvier being one of its first members; and now he began work in earnest. He published elementary schemes for the study of the natural history of animals, and began the collection of skeletons which soon became the chief feature of the establishment; and so great was his knowledge, that he rarely failed to name an animal from a single bone. This power impressed Cuvier with the idea of a philosophy in nature, and with the evidence of creative design and purpose of means to an end.

This collection was more and more developed, for nothing ever turned him from his purpose—that of making it the most complete in the world; no other pursuit, no relaxation, no absence, no sorrow, no illness, ever diverted him from his work. And to-day, those who visit Paris, will long remember the seventy-five acres of the Jardin des Plantes, with trees and flowers from every part of the globe; with thirteen rooms filled with skeletons and anatomical preparations of all kinds; with eleven rooms in the gallery of anthropology, containing every variety of the human species, in casts, mummies, and fossils; with the gallery of zoology, containing over two thousand mammalia, belonging to five hundred species, as many reptiles, ten thousand birds, and over two thousand five hundred fishes; with immense geological, mineralogical, and botanical collections; which now remain as one of the noblest monuments to the memory of Cuvier.

In the year 1800 the colleague of M. de Buffon died at an advanced age. This event led to Cuvier being

named professor in his place at the College of France. Here he taught natural philosophy, at the same time continuing his work on comparative anatomy at the Jardin des Plantes. On succeeding to this chair, he resigned that of the Central School at the Panthéon. His salary was often in arrears, but he bore it cheerfully; and some estimate may be formed of the pecuniary advantages then attending the career of a *savant*. Cuvier wrote to a friend: "You are not to suppose that Paris is so highly favoured; for twelve months' pay is now due at the Jardin des Plantes, and at all the National establishments for public instruction in Paris, as well as at Strasbourg; and if we envy the elephants, it is not because they are better paid than we are, but because while living on credit, as we do, they are not aware of it, and consequently are insensible to the pain it gives. You know the saying about the French people, that when they have no money they sing. We *savants*, who are not musicians, work at our sciences instead of singing, which amounts to the same thing."

In the same year Napoleon Bonaparte, who, as first consul, aspired to civil as well as to military glory, caused himself to be appointed president of the Institute of France, and in 1802 he, by virtue of his office, appointed Cuvier one of the six inspector-generals ordered to establish Lycées in thirty towns in France.

These Lycées are public schools, under the direction and management of the Government. The pupils who frequent them pay a small sum, which sum is appropriated to the use of the school. The professors receive their salaries from the Government, which reserves to itself a right to nominate a certain number of pupils gratis.

In the capacity of inspector, Cuvier established Lycées in Marseilles, Nice, and Bordeaux, which are now called Royal Colleges; and during the time he sojourned at Marseilles he prosecuted his studies on marine animals, and completed the work which he had begun during his residence at Caen—the natural history of the Mediterranean fishes.

Soon after his return, he was appointed one of the perpetual secretaries of the Institute of France, at a salary of six thousand francs per annum (£240). He now gave up the inspectorship, and devoted himself to his own special work. At this time his father met with a serious fall which caused his death, and at the same time his brother's wife passed away, leaving the two brothers alone. In this solitary condition Cuvier thought of seeking a companion. Marriage became a necessity for this rising man, and he was attracted to a lady of great merit, who had suffered both misfortune and poverty. Madame Duvancel was the widow of an official who perished on the scaffold in the year 1794, and was left with a small family.

They were married in the year 1803. This was no match of personal gain, for the lady had been deprived of her entire fortune by the Revolution, and left almost destitute. Cuvier had great affection for her, and saw in the union the best means of securing domestic enjoyment; for this lady, who possessed a rare combination of mind, manner, and disposition, threw a bright halo of happiness round him, which became his support in suffering, his refuge in trouble, and a powerful auxiliary when his heavy and important duties allowed him to steal an hour for rational and unrestrained conversation. In a word, she made him happy, was the best of companions, and when he

rose to greatness was his admirable helpmeet. An educated man needs companionship in mind, and not simply a housekeeper.

In the year 1808 it became the duty of Cuvier, as perpetual secretary, to present a report on the progress of Natural Sciences from the year 1789. A simple report was asked for, but the learned author produced one of the most brilliant treatises that had ever been presented, "serving as a beacon to the path which had already been traversed, and to that which was yet to be pursued."

Napoleon, as president, was so much struck with it, that he laid it before the council of state. Some of its sentences deserve to be written in letters of gold in every senate, and learned by heart by all politicians.

"The true object of science is to lead the mind of man towards its noble destination—a knowledge of truth, to spread sound and useful ideas among the lowest classes of the people, to draw human beings from the effects of prejudices and passions, to make reason the arbitrator and supreme guide of public opinion."

As the result of this admirable production, so full of sound wisdom, Cuvier was appointed a life councillor of the new Imperial Institute; and this position brought him frequently into contact with the emperor.

In his official capacity Cuvier next undertook the reorganisation of the old Italian Universities of Piedmont, Genoa, and Tuscany; and while at the latter place, he made good use of his time by making drawings, and collecting fossil bones; and in 1811 appeared one of the most important of all his labours—the great work on fossil remains, which opened new sources of wonder in the history of creation, and made an entire revolution in the study of geology.

For this great work, Cuvier had made some preparation by an essay, presented the previous year to the Academy, on the geology of the Paris basin, a district singularly rich in fossil remains.

Montmartre and its vicinity, covered with buildings and crowded with people, such as our East End of London, would not strike many observers as a promising field for scientific exploration; but it is the peculiarity of genius to read instruction where others can only see a blank, or a record of a commonplace character. Cuvier discovered in the geological construction, and the fossil remains of the Paris basin, elements for the solution of the most critical scientific questions, relative, not only to the locality, but to the globe at large.

In 1800 he found a few teeth, in following years a few bones; and after many years of patience and skill, he investigated and demonstrated the existence and place of a number of tapir-like animals formerly abounding on the banks of the ponds, which have left their mud and marl in the strata of the Paris basin. His anticipations seem like prophecies, based, as they were, on a tooth or a bone; but subsequent discoveries enabled him to verify them all, so that they became parts of scientific and general knowledge.

The effect of these investigations on the scientific world was prodigious.

"If," said Cuvier, "you have but the extremity of a bone well preserved, you may, by attention, consideration, and the aid of resources which analogy furnishes to skill, determine all the rest, as well as if you had the entire skeleton before you."\*

A visit was next paid to Holland, for the purpose

\* "Bridgewater Treatise," vol. i.



of establishing academies in that country, as well as in the Hanseatic towns. During Cuvier's stay in Hamburg, he received the unsolicited title of "Chevalier" from the emperor, which rank was assured to his heirs.

However, the hope of transmitting his worldly honours to his posterity was soon destroyed; for after being deprived of a daughter four years old in 1812, he was in 1813 bereaved of his son, who had reached the age of seven years. This last loss made a deep impression on him, which was never entirely effaced; for even after a lapse of years, he never saw a boy of that age without emotion, a feeling he did not strive to hide from his own family, or those with whom he was intimate; and often, when walking with his daughters, he would stop before a group of boys, who, as they played, reminded him of his son.

Cuvier was next dispatched to Rome for the purpose of organising the University in that city. Being a Protestant, the mission was one requiring peculiar forbearance and firmness; but Cuvier was equal to the occasion. Risen from the ranks, he knew what it was to be poor, and anxious to know how to learn.

His principle was that instruction would lead to civilisation, and civilisation to morality; therefore he taught, "Give schools before political rights; make citizens comprehend the duties that the state of society imposes on them; teach them what are political rights before you offer them for their enjoyment, and then all amelioration will be made without causing a shock. Imitate nature, which in the development of beings acts by gradation, and gives time for every member to arrive at perfection."

Comparative anatomy rising into importance during the eighteenth century, continued throughout that

period in a state of infancy. Linnæus and Buffon rendered valuable service ; but all former students in this branch of science were surpassed by Cuvier. The ignorance of natural objects at this period was very great. When the Committee of the French Academy were engaged in preparing the well-known Academy dictionary, Cuvier came into the room where they were holding a session.

"Glad to see you, M. Cuvier," said one of the party ; "we have just finished a definition which we think quite satisfactory, but on which we should like to have your opinion. We have been defining the word 'Crab,' and explained it thus :—

"'Crab—a small red fish, which walks backward.'"

"Perfect, gentlemen," said Cuvier, "only if you will give me leave, I will make one small observation in natural history. The crab is not a fish, it is not red, and it does not walk backwards. With these exceptions, your definition is excellent."

About this time political changes took place in France, and though Napoleon abdicated the throne, Louis XVIII., who succeeded him, retained Cuvier in office, by reason of his great administrative ability and upright life.

Three years later, the first edition of his "Animal Kingdom" appeared, in sixteen volumes : this is now to be seen in the British Museum. This work has served as the basis for subsequent geological classification. Cuvier studied very minutely the *interior* structure of animals, and based his classification on this, instead of *exterior* resemblance.

Very soon after this work appeared, a visit was paid to England, where he was received with the highest honours. As a proof of his widespread fame,

among the lower as well as the upper classes of society, a single instance will show. When in London, owing to the absence of his valet, he sent for a barber to shave him. When the operation was finished, Cuvier offered payment.

"I am too much honoured," replied the Gascon, for such the operator happened to be, "by having shaved the greatest man of the age, to accept any recompense." M. Cuvier allowed him the honour to the full extent, and engaged him to perform the function repeatedly, for which, at length, he was willing to accept payment.

During his sojourn in England Cuvier visited most places worthy of notice in London. His remark to His Majesty George IV., concerning our natural history, was that, if the private collections could be amassed into one, they would form a great national museum which would surpass all others. He was delighted with what he saw, and was pleased with the cordial manner in which he was received by our *savants* and statesmen. The only custom to which he could not reconcile himself during his stay was the formality and length of our public dinners; the long sittings which followed them were always mentioned by him with an expression of weariness, even in his countenance.

He much appreciated the courteous attention of Sir Joseph Banks, Sir Evered Home, and Sir William Herschel. The latter received him with the greatest kindness at his house, and showed him his large telescope, but unfortunately the night was too cloudy to profit by this famous instrument.

Cuvier returned to Paris, where fresh honours awaited him. He officiated at the coronation of Charles X., and received from that monarch the Decoration of Grand officer of the Legion of Honour; while the King of

Wurtemberg appointed him Commander of the order of the Crown. But during all this time he was doing earnest work for his country; and not for his country only, but for the whole scientific world. He wrote and lectured constantly, and so careful was he of his time, that he always read or wrote as he travelled in his carriage along the streets of Paris. A lamp being fixed in the back of the vehicle was used at night, until he found that he was injuring his eyesight, and was compelled to discontinue the practice.

Whilst sitting for his portrait, his daughter read to him the famous book by Sir Walter Scott, entitled "The Fortunes of Nigel"; and when too weary for scientific research, during the evening his wife read to him general literature.

The loss of his daughter in 1827, on the eve of her marriage, affected him much. At the age of twenty-two years, Clementine had endeared herself to all; of extreme liveliness, she was the idol of her family.

The effect of this loss on both parents was crushing. The father's hair grew white, and the lines gathered in his face, and for a time he seemed paralysed; but with that high sense of duty which he possessed, he roused himself, feeling that, as he was living for others, he had no right to sink under the heavy load of grief that was imposed upon him. So he went back to his work, and took his place again as the head of the Committee of the Interior. But at one of the councils, on essaying to speak, he burst into tears, and covered his bowed head with his hands, and sobbed bitterly. After a few moments he raised his head and said, "Pardon me, gentlemen, I was a father; but now I have lost all"; and with a violent effort he resumed the business of the council.

During the year 1828 appeared the first of a series of twenty volumes on Ichthyology (History of Fishes). In this work, Cuvier traces the progress of the history, dividing it into periods; first, that of unsystematic knowledge down to the sixteenth century; then the investigations of the seventeenth century, and the period of fixation of character, heralded in by Ray and Willoughby. Positive and distinct characters for the wider, as well as for the narrower, groups, appeared as objects of scientific research. This was the purpose of Cuvier in his great work, which he never wearied in completing. We may not entirely agree with his method; but we are justified in taking his system as the nearest approach which has yet been made to a natural method in that department. Cuvier qualified himself for this task, by investigating critically nearly eight thousand species of fishes.

In 1830 he paid a second visit to England; but this time it was arranged so as to escape the inevitable revolution caused by the tyranny of Charles X. As his carriage passed out of Paris, firing began, followed quickly by the dethronement of the king, and the restoration of liberty. During the six weeks of his stay in England, he was again *fêted*, and graciously received by the learned and the great, and once more the famous naturalist, formerly a half-starved student and tutor, became the honoured guest of the highest in the land.

This visit was much enjoyed; and after quiet had been restored to Paris, he returned to that city, and took up his former positions and dignities.

In the year 1832, Cuvier was created a Peer of France, by Louis Philippe. Every honour had come

that could be desired. His books were eagerly read; crowds attended his lectures; he was loved, honoured, and revered.

The last years of his life were spent under a burden of intellectual labour, such as few men could have borne. He continued to enrich the science of natural history by a long series of memoirs, which embraced a diversity of subjects, from the study of insects to the investigation of the species of rhinoceros; for it was in the study of Entomology (Insects) that the dawning efforts of his genius were first manifest. As he himself said: "The wonderful things met with in the organisation of insects have elevated my thoughts. If I had not studied insects from choice, I should have done so later from a conviction of its necessity."

A young student of medicine came to him one day, and ventured to tell him that he had discovered something new and remarkable in dissecting a human subject. "Are you an entomologist?" asked Cuvier.

"No," replied the student.

"Well then," said the great naturalist, "go and anatomise an insect, I care not which, the largest you can find, then re-consider your observation, and if it appears correct I will believe you on your word."

The student submitted to the proof; and soon after, having acquired more skill and greater knowledge, returned to Cuvier to thank him for his advice, and at the same time to confess his error.

"You see," said Cuvier, smiling, "my touchstone was a good one."

It was in the production of the great work, the "Regne Animal" (the Animal Kingdom), that Cuvier immortalised himself; and his system of classification has been of the greatest possible value to his suc-

cessors. He reduced the six classes of animals which had been suggested by Linnaeus—quadrupeds, birds, reptiles, fishes, insects, and worms—to four ; vertebrated animals (animals with backbone), molluscous animals (such as snails and oysters), articulated animals (corals and sea anemones), and fishes, making four in all. This classification, however, has become modified ; but Cuvier first suggested the method.

Whales and dolphins, though they live in the same element, should not be classed among the fishes, or because they resemble one another in the general form of the body, and in certain other external features. Cuvier maintained that all the structures of the animal should be studied, and physiology, as well as anatomy, be considered. The most important structures must be taken into account first of all, and the grand divisions of classification must rest upon them. In this great work Cuvier commences with man, whom he places in a genus by himself, and recognises only one species, diversified by varieties of races.

There can be no question as to the enormous advance presented by this classification of animals as thus arranged, based upon the system of Linnaeus, who, with the great worker Buffon, brought the study of natural history to a brilliant condition, and promoted its rapid growth, which continued after their days were over.

Cuvier took up the work, and so appreciated their labours, finding in one that which was wanting in the other, and knowing how to unite the excellencies of both in his own writings ; or rather, his genius, in its originality, left nothing incomplete, nothing which could make us feel the want of the true method on one side, or the absence of general views on the other.

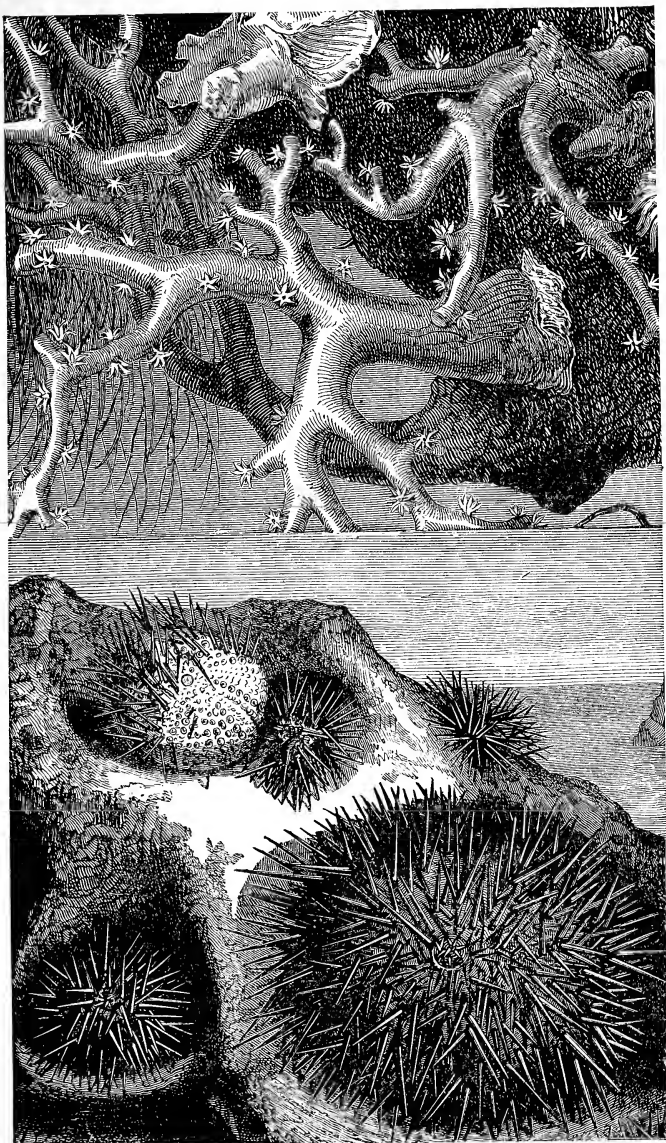
One of his most remarkable works was that upon "Nature," which is of such merit that it is specially worthy of mention. In it he says :—

"The word 'Nature' has assumed many meanings, but its chief significance is, that which a being derives from its birth, in opposition to that which it may derive from art. . . . It is in the nature of an oak to grow for three centuries, to have hard wood, to attain to great size, etc. It is that of a bird to raise itself in the air, to distinguish distant objects, etc. Man is by nature capable of education; his nature is weak, inconstant, etc. Each individual may possess, physically or morally, its own peculiar nature; it may be feeble or vigorous, mild or passionate, etc. Nature, then, is all beings, or the universe, or the world; and when considered as contingent and in opposition to the necessary Being, God, it is called Creation.

"Each being has in perfect agreement all that is necessary for its subsistence; each great change, in one organ, produces a change in others. A bird is a bird in every part; it is the same with a fish or an insect. All is linked together, all is dependent, all existence is chained to other existence, and that chain which connects them, and of which we can only see some small portions, is infinite in extent, space and time."

Cuvier believed that all this was due to some Supreme Intelligence, which had provided organs for fulfilling the ends for which all things were created. Also that each being is made for itself, and in itself is complete; it may resemble other beings, each equally composed of what it is fit for, but none can be composed with a view to another, nor to join it to a third by agreement of form; and that which is true of the least plant, of the smallest animal, is true of the most





POLYPES.

SEA-URCHINS.

perfect of animals—man. And all this that is true of this little world—as the ancient philosophers called it—is not the less true of the great world, the globe and all its inhabitants. The beings which compose it and who people it, contribute to its existence; they are necessary to each other, and to the whole; they have been so since this existence has subsisted; they will be so as long as it shall subsist.

“The world is like an individual, all its parts act on each other; we can imagine other worlds more or less rich, more or less peopled, the preservation of which rests on other means; but we cannot conceive this present world deprived of one or several classes of beings which inhabit it, any more than the body of man deprived of one or several of its organs.”

Amongst his numerous writings Cuvier largely contributed to the “Dictionary of Medical Sciences.” The most important of the papers written by him is found under the heading *Animal*, in which he describes the lower order of animals, which is exceedingly interesting. He says: “A little above the sponges are the monades (a small organism or germ), and other small microscopic animals, simple, and uncertain in form, but which move in water with greater or less rapidity.

“The polypes (corals and sea anemones) only exceed these by having a definite shape and some distinct members round the mouth; several of them fixed to the solid masses which they themselves produce, have no motion but in their members, and are incapable of changing their place. The sea-urchins possess a covering more or less hard, and their many members enable them to travel. The intestinal worms live in other animals; they have neither members, heart nor blood vessels; the body is long and sometimes in rings.”

Then follow insects, etc., and the whole article concludes with a comparison between plants and animals. It is written from the beginning to the end in plain unscientific language, so that it may be easily understood by the ordinary reader.

And so year after year, by his investigations, lectures, books, and smaller contributions Cuvier added to the store of knowledge that he was so anxious to give to the history of the earth, and which he left as a precious legacy to all those who should follow him.

Although so occupied and often absorbed in scientific pursuits, he never neglected the opportunity of doing good. His purse was ever open to the needy and unfortunate, of all countries and stations: the miserable inhabitant of the dens of Paris and the modest student struggling under adversity, were alike the recipients of his bounty. Many hotels in the neighbourhood of the colleges, had students living in the top stories who were so poor that they had to subscribe to get a book or two between them. They would occasionally be surprised by a visit from the great teacher. He came to offer, with the greatest courtesy, the assistance he knew they required; and if they were ill, he did not rest satisfied until he had obtained advice and nourishment for them. Himself keenly alive to the slightest rudeness or neglect, and grateful for the smallest proof of affection, he knew how to give, not only with a liberal hand, but with a delicacy which never wounded the most sensitive temper. Cuvier also, in common with all who prefer the interests of science to their own momentary fame, possessed the candour which marks real learning: he never hesitated either to avow, or to rectify a fault—a perfection which mingled with his private as well as

with his public life. He was kind to the learned of all countries; for, wholly divested of national prejudices, and delighting to dwell on that which was noble in all mankind, he was never for an instant obscured by party spirit, and was wholly unconscious of that supercilious feeling of superiority which is so hurtful to the progress of the individual, as well as to the welfare of others.

Passing from philosophy to religion, Cuvier was a French Protestant, and was warmly attached to that system of Christian faith and order which has been bequeathed to their country by the heroic Huguenots. No branch of the Church possesses a more brilliant history—a history just of that nature which would light up the genius, and inspire the enthusiasm of a man like Cuvier. As a Protestant he was educated, and he carried his convictions throughout his University career; and during his sojourn in Normandy, with the Protestant family in which he acted as tutor, those convictions were doubtless deepened. Although his religious character was not made conspicuous, yet his writings, and his exertions throughout his life for the welfare of the people and the world at large, gave good evidence of its depth and truth, and at his death his memory was revered by all French pastors. He promoted the circulation of the Holy Scriptures, and became a vice-president of the Bible Society. He was as active in the cause of religious education, as he was in so-called secular education; and in a discourse which he delivered at the distribution of prizes instituted for the reward of virtuous actions, he, with all the fervour of a French orator, enforced upon his audience the primary duties of love to God and love to man.

Whether speaking on scientific subjects, or on social

or religious topics, Cuvier was great as an orator. He had a flexible and sonorous voice which resounded far and wide. His audiences were always enthusiastic, and many waited long to obtain a good seat, so great was deemed the privilege of listening to his discourses.

The year 1832 was a memorable one, for not only was Paris in a disturbed state politically, but the dreaded scourge of cholera prevailed. The disease raged in Cuvier's neighbourhood, and he saw many cut off by it, in the midst of their youth and strength. At this time he was obliged to give up his evening visits and the few relaxations he allowed himself.

Secluding himself from all society, he performed his public duties, and applied himself with renewed energy to his scientific pursuits; but this close application soon told upon his health.

On May 8th, in that year, he opened the third part of his course of lectures at the College of France, upon the history of science, but this was his last discourse. It was specially impressive, and grandly comprehensive.

In this lecture he discoursed upon the meaning of the changes which had occurred on the surface of the earth, in relation to the succession of plants and animals on the globe; also the present creation. He stated the manner in which he proposed, in his subsequent addresses, to view the present in relation to the past, and concluded by saying: "This will be the object of our future investigations, if time, health, and strength are given to me, so as to continue and finish them with you." The hall slowly emptied, and as the students departed an undefined sadness seemed to weigh upon them, for they felt that the days of their great teacher were numbered.

On the evening of the same day Cuvier felt some

pain in his right arm, which was supposed to proceed from rheumatism. The following morning he presided over a committee with his usual ability; but during dinner on the same day, he felt some difficulty in swallowing, and the numbness of the arm increased. On feeling himself thus ill, in order to avert attention, he said, "I must eat more soup," as to swallow solids he found to be impossible. Advice was sought, but the next day both arms became paralysed, and the difficulty in swallowing increased. He made his will with perfect calmness, and it showed the tenderest solicitude for those whose care and affection had comforted his life, as well as for those who had shared his scientific labours. He was unable to sign the will, but it was attested by four witnesses.

Paralysis crept on, the legs were attacked, his speech became affected, and he whispered, "It is the nerves of volition that are at fault."

He spoke as well as he was able of his last lecture, and said to M. Pasquier, one of his intimate friends. "Behold a very different person from the man of Tuesday. I had great things to do, all was prepared and ready, after thirty years of labour and research; there remained but to write; and now the hands fail, and carry with them, the head."

His friend expressed the interest universally felt for him; to which Cuvier whispered, "I like to think so; I have long laboured to render myself worthy of it." In the evening fever showed itself, but on Sunday morning it disappeared for a short time. Later in the day, the accelerated respiration proved that only a part of the lungs were in action, and the physicians, willing to try everything, proposed to cauterise the vertebrae of the neck. The question,

Had he right to die? rendered him obedient to their wishes. But he was spared this bodily torture, and leeches were all they applied.

During the application Cuvier observed with the greatest simplicity that it was he who had first discovered that leeches possess red blood, alluding to one of his memoirs, written during his sojourn in Normandy. The consummate master thus spoke of science for the last time, by recalling one of his first works on natural history.

He attempted to drink, but with little success, and gave the glass of lemonade to his daughter-in-law to drink, saying it was very delightful to see those he loved still able to swallow. His respiration became more and more rapid; he raised his head, and then letting it fall, as if in meditation, he resigned his great soul to his Creator without a struggle.

Those who entered the room afterwards, would have thought that the beautiful old man, seated in the armchair by the fireplace, was simply asleep; and would have intuitively walked softly across the room for fear of disturbing him; so little did that calm and noble countenance, that peaceful and benevolent mouth, indicate that death had laid its icy hand upon them. But it would only be necessary to turn to the despairing looks, the heartrending grief, and the mute anguish of those around to be convinced that all human efforts were unavailing, and that the great master of science was no more.

He desired to be buried without ceremony in the cemetery of Père-la-Chaise, under the tombstone which covered his beloved daughter; but it was impossible for such a man as Cuvier to pass away without public manifestation of respect at the last sad ceremony.

The funeral procession was followed by the representatives of the state, the academies, and various learned and legislative bodies: each pronounced a funeral oration over the grave, according to the usual custom of the country.

The remains were borne by pupils from the various laboratories and schools. May 13th, 1832, was indeed a sorrowful day, and the death of Baron Cuvier at the age of sixty-three, was looked upon as a national loss.

It was not possible for such a man as Cuvier to die rich; he was generous to a fault. Besides being anxious for the advancement of his branch of national science, he spent large sums in order to obtain specimens from abroad, and to dig out fossils at home. He left about £4,000 sterling, a library valued at the same amount, and a house for his family. As it was so desirable that his library, numbering nineteen thousand volumes, should remain entire for the use of the students, and such being the wish of the widow, the Government agreed to purchase the whole, but no building was found large enough to contain it in its entire state. It was therefore agreed to divide it between the schools of law and medicine, the normal school, and the Jardin des Plantes.

The work accomplished by Cuvier was of untold value in perfecting the system of classification of the Animal Kingdom, in his careful and exhaustive investigations in many of the branches of natural history, especially in the most important advances he effected in the history of former periods of the development of the earth. It is not too much to say that Cuvier may fairly claim to have been the chief founder of the modern science of Palæontology (the science of fossils). This is often spoken of by some



writers as a branch of geology. This is by no means correct. The only relation between the two sciences arises from the fact that fossils occur in the rocks, and rocks are the study of the geologist. In its essence Palæontology is concerned entirely with the study of the remains of animals and plants, rather than with the rocks in which they are often found imbedded.

Judging the man by his work and life, it must be acknowledged that Cuvier was one of the greatest students and teachers of nature that ever lived ; his work being true, lasts. Moreover, there is no doubt that he had but few failings, and that he possessed a large amount of wisdom and virtue. He was a staunch friend to religious education, and perhaps his apparent ambition for social greatness and position may have been influenced by the knowledge that this influence would further his work as a zoologist and as a promoter of education. Humility was a marked feature of his character, and he was thankful for the correction of errors ; he gloried as much in the discoveries of another as in those of his own, and in the triumph of joint labours unhesitatingly gave the preference to his colleague. So in this way not only do the books of such a man live, but his whole life—with its untiring energy, its promptness, its order, its unfaltering purpose, its high aims, as well as its tenderness and nobility of heart—is altogether a constant inspiration. This wonderful life can be summed up in a few lines : Born, August 23rd, 1769. His early manhood passed during the struggle of the first Revolution. He lived under Louis XVI., the Directory, Napoleon, Louis XVIII., the second Revolution, Charles X.; was made a peer of France by Louis Philippe, and died May 13th, 1832.



CHARLES KINGSLEY.



#### IV.

### CHARLES KINGSLEY

“And Nature, the old nurse, took  
The child upon her knee,  
Saying, ‘Here’s a story-book  
My Father has written for thee.

“‘Come wander with me,’ she said,  
‘Into regions yet untrod,  
And read what is still unread  
In the manuscripts of God.’

“And he wandered away and away  
With Nature, the dear old nurse,  
Who sang to him night and day,  
The rhymes of the Universe.”

LONGFELLOW.

**B**IOGRAPHIES of great, but especially *good*, men are most instructive, and useful as helps, guides, and incentives to others.

Charles Kingsley has done more than any other man in raising the standard of our literature, by giving to the reading public the purest and most elevating fiction, and in presenting scientific subjects in their most attractive form, and in words which linger in the minds and memories of all those who had the good fortune to listen to his teachings

The difference between men consists, in a great measure, in the intelligence of their observation. The Russian proverb says of the non-observant man, "He goes through the forest and sees no firewood." It is the mind that sees as well as the eye. Where unthinking gazers observe nothing, men of intelligent vision behold a universe.

It is not as a Christian socialist, social reformer, brilliant novelist, or eloquent preacher, but as a naturalist, a true lover of nature, that we consider the subject of this brief sketch. Not that he accomplished any special work, but that he showed us how one man walks through the world with his eyes open, another with his eyes shut; and upon this difference depends all the superiority of knowledge which one man acquires over another.

It was on June 12th, 1819, at Holne Vicarage, Devonshire, under the brow of Dartmoor, that Charles Kingsley was born. His father was a descendant of an old family, which had produced many soldiers; but through misfortunes which overtook the family, he was forced to adopt a profession, so had taken Orders after he had reached the age of thirty. He moved to various parts of the country—Nottinghamshire, Northamptonshire, Devonshire, and finally to Chelsea, where he died in 1860. Charles inherited talents from both parents,—to his father he owed his love of art, his sporting tastes, and his fighting blood. From his mother, his love of travel, natural science, and literature. At four years of age Charles composed poems, and began to preach from a small pulpit in his nursery; putting on his pinafore as a surplice, he would hold forth to an imaginary congregation. These short discourses were taken down by his mother,

and shown to the then Bishop of Peterborough, who predicted that the boy would become famous.

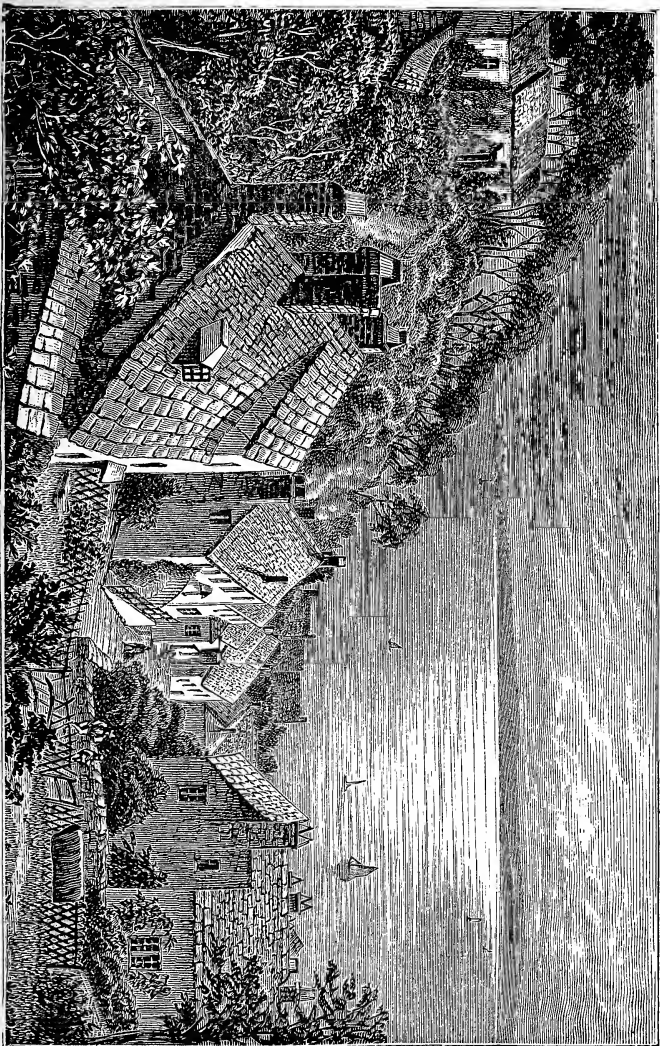
Barnack Rectory was a fine old fourteenth century house, boasting of a ghost chamber, known as "Button Caps." In writing of this, and the effect it had upon his early days, he says, "Button lived in the great north room at Barnack. I knew him well. He used to walk across the room in flopping slippers, and turn over the leaves of books to find the missing deed, whereof he had defrauded the orphan and the widow. He was an old rector of Barnack. Everybody heard him who chose. Nobody ever saw him; but, in spite of that, he wore a flowered dressing-gown, and a cap with a button on it. I never heard of any skeleton being found; and Button Caps' history had nothing to do with murder, only with avarice and cheating. Sometimes he turned cross, and played 'Pottergist,' as the Germans say, rolling the barrels about in the cellar with surprising noise, which was undignified. So he was always ashamed of himself, putting them all back in their places before the morning. I suppose he has gone now. Ghosts hate mortally a certificated national schoolmaster, and as soon as people give up believing in them go away in a huff—or perhaps some one had been laying phosphoric paste about, and he ate thereof, and then ran down to the pond and drank, until he burst. He was rats."

It was at Barnack, between Peterborough and Stamford, in the great Fen country, that Charles's love for natural history developed. His father was one of the old-fashioned kind of English clergymen, an excellent parson as well as a fine sportsman; so very early Charles accompanied him on his expeditions and helped to bring back the game bag, rich in those

days with bittern and bustard, ruff and reeve, which then were abundant. The effect on the boy's mind of the flat scenery, and the wide sweep of horizon of the Lincolnshire meres hidden in mist, or suffused with the afterglow of the setting sun, were never forgotten, and in the prelude to "Hereward the Wake" they are fully described. They have a beauty of their own, those great Fens, a beauty as of the sea, of boundless expanse and freedom. Overhead, the arch of heaven spreads more ample than elsewhere, and that mighty vastness gives such cloud-lands, such sunrises, such sunsets, as can be seen nowhere else within these isles.

His fancy lingered as he tells us, "over the shining meres, the golden reed beds, the countless waterfowl, the strange and gaudy insects; the wild nature, the mystery, the majesty were there, which haunted the deep fen for many hundred years; for grand enough it was, that black, ugly place, backed by Caistor Hanglands, and patches of the primeval forest; white dark-green alders and pale-green reeds stretched for miles round the broad lagoon, where the coot clanked, and the bittern boomed, and the sedge-bird, not content with its own sweet song, mocked the notes of all the birds around; while high overhead hovered, motionless, hawk beyond hawk, buzzard beyond buzzard, kite beyond kite, as far as the eye could see. Far off, upon the silver mere, would rise a puff of smoke from a punt, invisible from its flatness and white paint.

"Then down with the wind came the boom of the great stanchion gun; and after that sound another louder as it neared—a cry, as of all the bells of Cambridge and all the hounds of Cottesmere; and



A BIT OF CLOVELLY.

overhead rushed and whirled the skein of tangled wild fowl, screaming, piping, clacking, croaking—filling the air with the hoarse rattle of their wings, while clear above all sounded the shrill whistle of the curlew, and the trumpet note of the wild swan. They are all gone now. Gone are the ruffs, avocets, reeves, spoonbills, bitterns; the very snipe one hears, disdains to breed. Gone, too, is that most exquisite of butterflies—*Lycæna dispar*—and many a curious insect more.”

Such was the hunting-ground of the boy's early years, and notwithstanding the ague and other discomforts of this part of England, the great Fen district was charming; for during Kingsley's boyhood it abounded in varieties of life that are now, alas, extinct. The boy's mind was taken up from his infancy with the characters of the alphabet by which God spells out His wisdom, power, and goodness—heard in the wild bird's note, and seen in the wayside flower; and the lad learned early that this world of ours is God's world, and may be made the vestibule of heaven.

At the age of eleven years, the family removed to Clovelly in Devonshire, and the contrast between the flat eastern country and the rocky Devonshire coast, with its new fauna and flora, and its blue sea, filled him with delight and wonder. The new elements of his life at Clovelly, the unique scenery, the impressionable character of the people, the singular beauty and courage of the men and boys, and the passionate sympathy of the women in the wild life of their husbands and sons, threw a charm of romance over the parish work. The people sprang to touch under the influence of their new rector—a man who feared no danger, and who could steer a boat, hoist and lower



a sail, "shoot" a herring net, and haul a seine, even as one of themselves.

And when the herring fleet put to sea, whatever the weather might be, Mr. Kingsley, with his wife and boys, would start down to the quay and give a short parting service, at which "men who worked, and women who wept," would join in singing the hundred and twenty-first Psalm,

"To Sion's hill I lift my eyes,  
From thence expecting aid;  
From Sion's hill, and Sion's God  
Who heaven and earth has made."

This appropriate psalm was always sung with the fervour of those who have death or danger staring them in the face. Such memories still live, and make the name of Kingsley a household word in quaint old Clovelly.

It was a life such as this that left its mark on the mind of young Charles, full of romance and magic incident; as when the old bay, darkened with the grey columns of the waterspouts stalking across the waves before the northern gale, and the tiny herring-boats, fleeing from their nets right for the breakers, hoping for more mercy even from those iron walls of rock, than from the pitiless, howling waste of spray behind them; and that merry beach beside the town, covered with shrieking women and old men, casting themselves on to the pebbles in fruitless agonies of prayer, as corpse after corpse swept up at the feet of wife and child; till, in one case alone, a single dawn saw upwards of sixty widows and orphans weeping over those who had gone out the night before in the fulness of strength and courage. Such scenes as these coloured his boyhood and reflected in his after life.

Yet his love for Clovelly was a passion. "Now that you have seen the dear old paradise," he said to his wife, after her first visit there in 1854, "you know what was the inspiration of my life before I met you."

Charles was not, however, permitted to enjoy such charms for long. After a few months he was sent to school at Clifton; and such localities as the charming Downs, the Nightingale Valley, the Stapleton Dell, and other beautiful surroundings of Bristol, were alike treasuries of natural history to him, and which he carefully investigated; becoming an ardent geologist, and searching with delight the magnificent section of rock beneath the famous bridge. There, every formation, from the old Red sandstone to the Carboniferous limestone, is exposed and waiting to be studied.

From Clifton, Charles went to the grammar school at Helston, then under the mastership of the Rev. Derwent Coleridge, son of the famous poet. Here he made progress in his studies, was gentle, fond of quiet, and a passionate lover of natural history; yet, for all his good qualities, he was not popular among his fellows. He knew too much, and his mind was generally on a higher level than theirs; and though strong and active, he was not an expert at games. He never made a score at cricket; but in adventure he was first and foremost. The playground was separated from a field by a lane, not very narrow, but very deep. To jump from the playground wall to the wall opposite, and to jump back again, was a considerable trial of nerve and muscle. Moreover, the walls were not on a level, and were rounded on the top; and a fall into the lane would involve broken

bones, but this jump was one of the favourite performances of Charles.

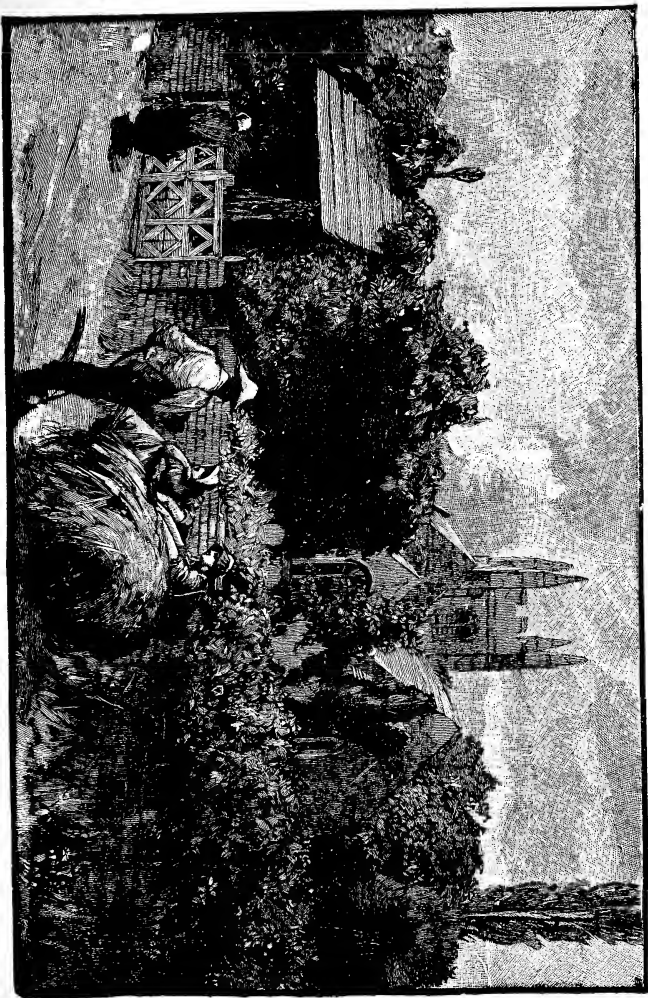
On one occasion he climbed a tall tree, in order to obtain an egg from a hawk's nest. For three or four days he had done this with impunity, but on the fifth day the bird was on her nest, and when the boy put forth his hand to take the egg, she resented the intrusion. To most, this sudden attack, apart from the pain inflicted by the bird's beak and claws, would have proved fatal. Many lads would have loosed their hold and fallen, but Charles did not flinch. He came down as though nothing had happened, notwithstanding his wounded hand was streaming with blood. To show his capability of bearing pain, he once suffered from a sore finger, which he sought to cure by cautery. So heating the poker redhot in the schoolroom fire, he calmly applied it two or three times, until he thought his object was attained.

As a student, he was only partially successful. For the study of languages he had no great liking. Greek and Latin interested him only because of their subject matter; but for classics, so-called, he had not the slight inclination. His passion was for natural history, especially botany and geology; and for these he had an absolute enthusiasm. He enjoyed nothing so much as to go forth hammer in hand and his *vasculum* (collecting box) slung round his neck, on some long expedition in quest of new plants, and for the purpose of investigating the cliffs near Helston, which are so dear to every geologist. In writing to his mother, he says on one occasion, "There is no botany yet, but I have been studying a little mineralogy and geology. Tell papa I have a good specimen of horn-

blende rock from the Lizard, and that I have found large quantities of a very beautiful mineral, but whether it is schorl or axinite I cannot determine. Tell him also that the gradations of mica, slate, and Granwacké slate are very beautiful and perfect here." This short extract will serve to show how careful and painstaking he was in his examinations, and how carefully he described what he discovered by minute observation, and from his intense love of nature.

In the year 1836 the family removed to Chelsea, and the delights of a west-country life were exchanged for one in the great city. The boy felt the change keenly, and as he walked the London streets daily, backwards and forwards from his home to King's College for the purpose of study, he pined for the Devonshire coast, and for the opportunities of pursuing his nature studies. By dint of hard work, and extraordinary perseverance, he made rapid progress in learning; but the home at Chelsea was not a bright or happy one. His parents were engrossed in the duties of the parish, and as he himself said, "We have no visitors but clergymen, and they talk of nothing but schools, church duties, vestries, and curates." So the lad was thrown upon his own resources, and for lack of variety, he read every book that he could lay his hands upon—old plays, old ballads, old volumes such as "Percy's Reliques." Southey's, Shelley's, and Coleridge's poetry, he knew by heart. His favourite books were Sir Thomas Malory's "La Morte d'Arthur," and Spenser's "Faerie Queen."

After two years of study, Charles left London for Magdalene College, Cambridge, where he soon gained a scholarship. Here he made friends, but very soon became troubled with religious doubts, and the



EVERSLEY CHURCH, HAMPSHIRE.

conflict between faith and unbelief became so severe, that he fell reckless and very nearly gave up all for lost. He read but little, but went in for excitement of all kinds—boating, duck-shooting, fencing, boxing, hunting; in fact anything to deaden the remembrance of the happy past: the present, just then, promised to him no future. More than once he had resolved to leave England for the Far West, and there become a prairie hunter; as he himself records: “I meant to go after taking my degree and throw myself into the wild life to sink or swim, escaping in this way from a civilisation which only tempted and maddened me with the envy of a poor man.”

On a visit to Ipsden in Oxfordshire, where his father undertook temporary duty, he met with the lady whom he loved at first sight, and who afterwards became his wife. Referring to this event he says, “That was my real wedding day.” At this meeting, his soul awoke under the sunshine of love, and this lady’s faith in God helped to fix his own. He resolved to enter the Church, rather than go to the Bar, of which he had some thoughts.

Leaving Cambridge in 1842, he began to read for holy orders, and in July of the same year was ordained deacon by Bishop Sumner, and soon after became curate of Eversley. So that, at the age of twenty-three, he settled down in that quiet Hampshire village, which became his home for thirty-three years.

There are but few prettier places within easy reach of London than Eversley. The features of the country are not grand, but they are full of picturesque effect. The village stands in the midst of a stretch of breezy heathland, which is fragrant with the odour of fir

forests all the year round, and in summer is rich with the golden bloom of the broom. The sweep of open moorland covers many miles, and the mass of colour in the autumn is superb. Being on the border of old Windsor Forest, it is surrounded with young forests of firs, and is altogether the place for a naturalist. The rambling rectory house, with its quaint gables and straggling garden, gay with flowers; the old red tower of the church; the well-ordered churchyard, backed with fields and copses; and line after line of wood and hedgerow as the country climbs up towards and past Heckfield and Strathfieldsaye, gives this part of England a charm and romance which linger on in spite of the advance of civilisation and the devastating hand of the builder. In the locality there are choice bits of primeval forest to be found, where the birds make their nests and the trees flourish in undisturbed security. It was to this charming spot in 1842 that Charles Kingsley came, little more than a boy in years, fresh with honours from Cambridge, and here buried his "first-class"—and much beside which the world would value more, and which was then little suspected—in a country curacy. Here for thirty-three years he lived, loved, and laboured, fighting his way to fame, often against great odds; and so gradually made his voice heard far and wide. But he himself was content, thankful to live out his days at Eversley, visiting the poor, nursing the sick, preaching in the same church, talking to the same people, fishing the same streams, looking on the same fields, year after year; living, in short, what many men would consider a dull, monotonous life.

When wearied with the chair of Modern History at

Cambridge, or tired in occupying the pulpits of Chester Cathedral and Westminster Abbey, he regained his freshness from the breath and companionship of his beloved woods, far-stretching moors, and the sparkle of his trout streams; and when the world was shouting applause or disapproval, and eyes were strained to see the bold poet-priest, and hands were weaving garlands for him, and lips were prophesying great things concerning him, he, heedless of them all, would betake himself to quiet Eversley and busy himself with birds, beasts, and insects, trees and flowers; and with much talk of farmyard and harvest field, stable and kennel, with happy thoughts about the geological formation of hill and valley, or the antiquity and genesis of the woods around him, or the meaning and purpose of the century-old road tracks, in the heather under his feet, he was supremely happy and content. As he himself said, "My amusements are in green fields and clear trout streams, and a gallop through the winter fir woods; and perhaps this fine healthy life makes my little lark's pipe all the fresher and clearer when it tries a song."

Charles Kingsley was a true lover of nature, although he made no important discoveries, and did not add much to our knowledge of natural science; but as did Gilbert White at Selborne, he taught us that :—

"The earth is crammed with heaven,  
And every common bush afire with God,  
Had we but eyes to see it."

His address to lads strikes the right keynote, giving the cue for teaching, which would make our youth grow into the manliest of men. He said, "God has given us eyes; it is our duty to use them. If your



parents try to teach you your lessons in the most agreeable way, by beautiful picture books, would it not be ungracious and ungrateful to shut your eyes to those pictures, and refuse to learn? God's book, which is the universe, and the reading of this book, which is science, can do you nothing but good, and teach you nothing but wisdom. So use your eyes and your intellect, your senses and your brains, and learn what God is trying to teach you continually."

Happy truly is the naturalist. He has no time for melancholy or dreaming; the earth becomes to him transparent. Everywhere he sees significance, harmonies, laws, chains of cause and effect, endlessly interlinked, which draw him out of the narrow sphere of self, into a pure and wholesome region of joy and wonder. Kingsley must ever rank amongst our most perfect naturalists. He believed that every pebble held a treasure, every bud a revelation. That contrast in the old story of "Eyes and no Eyes" was the contrast between him and common men. That eagle eye of his seemed to discern every shade and form of animal and vegetable life. His listening ear, like that of the hero of the fairy tale, seemed almost to catch the growing of the grass and the opening of the shell. Nature to him was a companion speaking with a thousand voices, and, above all, it was the voice of God, the face of the Eternal and otherwise Invisible, as it can only be to those who love and know it. For his was a wakefulness, not only to the force and beauty of the outward world, but to the causes of its mysterious operations, and to the explanations given by its patient students and investigators.

In a lecture delivered at Reading in 1846 upon "The Study of Natural History," he said: "Studies

which have to do with man's history, man's thoughts, man's feelings, are too exciting, too personal, often,—alas ! too tragical, to allow us to read them calmly at first. The men and women of whom we read are so like ourselves, that we unconsciously begin to love or hate them the first five minutes ; and so read history as we do a novel, hurrying on to see when the supposed hero or heroine gets happily married, and the supposed villain safely hanged, at the end of the chapter ; having forgotten all the while, in our haste, to ascertain which is the hero and which is the villain. Now, what seems to me to be wanted for young minds is a study, in which no personal likes or dislikes shall tempt them out of the path of mental honesty ; a study in which they shall be free to look at facts as they are, and draw their conclusions patiently and dispassionately. And such a study I have found in that of natural history.” So in daily practice, though most abundant in other labours, he found time for long natural history rambles, and by keeping eyes and ears open, hardly a drifting cloud went by unnoticed, or the hum of an insect unheard.

In all nature he saw something to admire, and his walks, to him, were as poems. On his lawn dwelt a family of toads, that lived on from year to year in the same hole in the green bank, which the scythe was never allowed to approach. He had two little friends in a pair of sand wasps, which lived in a crack of the window in his dressing-room ; one of which he had rescued from drowning in a hand basin, taking it out tenderly and putting it in the sunshine to dry.

The little fly-catcher which built its nest every year under his bedroom window was a constant joy to him.

He had also a favourite slow-worm in the church-

yard, which his parishioners were warned not to kill. Such tastes he encouraged in his children, and in the lads of the village, teaching them to love and handle gently, without disgust, all living things,—toads, beetles, frogs, etc.—as being works and wonders from the hands of a living God; and though all this was true, and that he loved such humble creatures, yet to spiders he had the greatest aversion.

In lecturing to the young men of the city of Chester, he showed that, even surrounded as they were, far away from green fields and heathy commons, they were able to pursue the fascinating study of natural history; and his lectures on “Town Geology” were so delivered that any townsman might learn how to judge—roughly perhaps, but on the whole, accurately—of the rocks and soils of his own neighbourhood, taking as his texts such titles as “The Pebbles in the Street,” “The Stones in the Wall,” “The Lime in the Mortar,” and “The Slates on the Roof.”

The glories of the Alps, the exquisite verdure of the West Indies, did not blind him to the less impressive beauties of English hills and hedgerows; and even in the dull streets of man-made town he found much of interest.

At one of his lectures delivered at Reading, he held up a stone, saying, “See this pebble which I hold in my hand, picked up out of the street as I came along. It shall be my only object to-night. This little black rounded pebble may, and will surely, if I be patient and honest enough, tell me a tale wilder and grander than any which I could have dreamed for myself. Listen! ‘Ages and ages since, thousands on thousands of years before there was a man to till the ground, I, the little pebble, was a living sponge in the

milky depth of the great chalk ocean ; and hundreds of living atomies, each more fantastic than a ghost painter's dreams, swam round me, and grew on me and multiplied, till I became a tiny hive of wonders, each one of which would take you a lifetime to understand. And then, I cannot tell you how, and till I tell you you will never know, the delicate flint needles in my skin gathered other particles of flint to them, and I, and all my inhabitants, became a stone ; and the chalk mud settled round us—I know not how—and covered us in, and for ages on ages I lay buried in the nether dark, and felt the glow of the nether fires, and was cracked and tossed by a hundred earthquakes. Again and again I have been part of an island, and then again sunk beneath the sea, to be upheaved again after long centuries, till I saw the light once more, and dropped from the face of some chalk cliff far away among high hills which have long since been swept off the face of the earth, and was tossed by currents till I became a pebble on the beach, while Reading was a sandbank in a shallow sea. There I lay and rolled, till I was rounded, for many a century more, and a new earth was made, and I was mixed up with fresh flints from wasting chalk hills, and with freestone from the Gloucestershire wolds, and with quartz boulders from the mountains of Wales, while over me swept the carcasses of drowned elephants and bisons, and many a monstrous beast ; and above me floated uprooted palms and tropic fruits and seeds, the wrecks of a dying world. And then there came another age,—

“And it grew wondrous cold ;  
And ice, mast-high, came floating by  
As green as emerald.”

“‘ And as the icebergs melted in the sun, the stones and the silt fell out of them and covered them up ; and I was in darkness once more, vexed by many an earthquake, till I became part of this brave English land. And now, I am a pebble here in Reading street, to be ground beneath the feet of busy men ; and yet you cannot kill me, or hinder my fulfilling the law which cannot be broken. This year I am a pebble in the street ; next year, I shall be dust upon the fields above ; and the year after that I shall be alive again, and rise from the ground as fair, green wheat-stems, bearing up food for the use of man. And even after that, you cannot kill me. The trampled and sodden straw will rot, only to enter into a new life ; and I shall pass through a fresh cycle of adventures, age after age, till time shall be no more ; doing my work in my generation, and fulfilling to the last the will of God, as faithfully as when I was the water breathing sponge in the abysses of the sea.”’

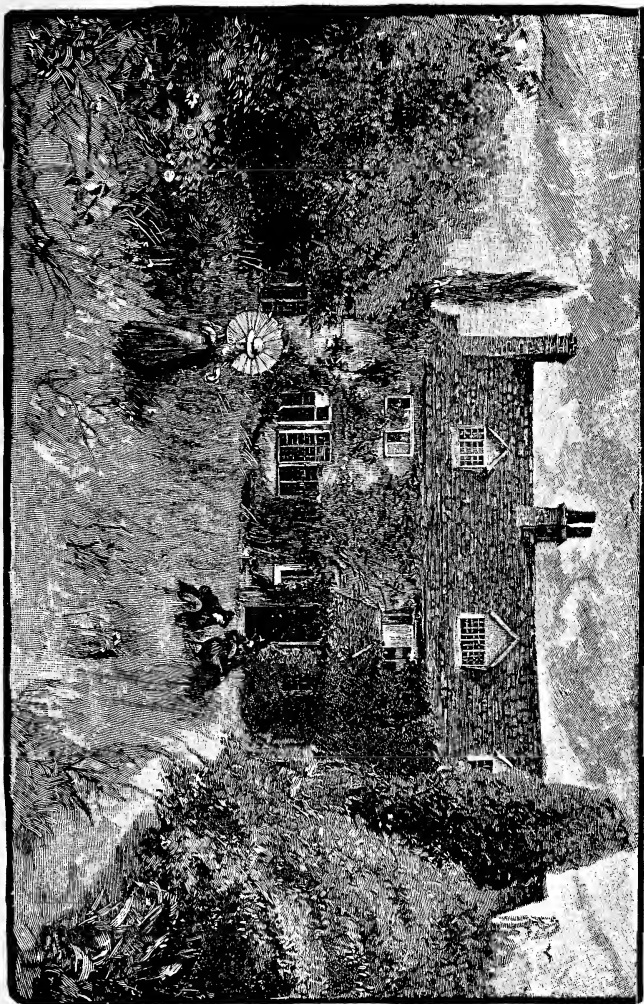
Second only to the good effect of such a study as this on the logical faculty, seems to me to be its effect on the imagination. Not merely in such objects as the pebble, but in the tiniest piece of mould on a decayed fruit, the tiniest animalcule from the stagnant pool, will imagination find inexhaustible wonders, and fancy find a fairyland. An hour or two every day, spent after business in the study of botany, geology, entomology, at the telescope or the microscope, is so much refreshment gained for the mind for to-morrow's labour ; so much rest for the irritated or anxious feelings, often so much saved from frivolity or sin. And how easy is this pursuit. How abundant the subjects of it. Look around you. Within the reach of each

one are wonders beyond all poets' dreams. An hour's walk in the summer will furnish you with subjects for months of investigation in the form of plants, shells, animalcules, on each of which a whole volume might be written. And even at the seemingly dead season of the year fancy not that nature is dead, nor even that she sleeps awhile. Every leaf which drops from the bough to return again into its gases and its dust, is working out chemical problems which have puzzled a Boyle and a Lavoisier, and about which a Liebig and a Faraday will now tell you that they have but some dim guess, and that they only stand upon the threshold of knowledge, like children "gathering a few pebbles upon the shore of an illimitable sea."

Even though you are confined to the town or city, go to the water-butt in the nearest back yard, and there in the one pinch of green scum, in one spoonful of water, behold a whole "*Divina Commedia*" of living forms, more fantastic a thousand times than those with which Dante peopled his unseen world.

Then again, the study of natural history is of great practical benefit. How much money has been wasted for the want of a little knowledge. How many a mine is sought for where no mine could possibly be, or crop attempted to be grown where no such crop could grow? How many a hidden treasure, on the other hand, do men walk over unheeding! How many a new material, how many an improved process in manufacture is possible, yet is passed over for want of a little scientific knowledge?

Not many years since the naturalist was looked upon as a harmless enthusiast, who went "bug hunting" simply because it was thought that he had not spirit enough to follow a fox; and an amiable man



EVERSLY RECTORY.

(For thirty-three years the residence of Charles Kingsley.)

was literally bullied out of the New Forest, because he dared to make a collection of fossil shells from Hordwell cliffs, for exploring which there was soon after established a society of subscribers and correspondents. On another occasion a gentleman was seized by two keepers in the act of wandering in Epping Forest at dead of night, with a dark lantern, a jar of strange sweet compound, and innumerable pockets full of pill boxes ; he found it very difficult to make his captors believe that he was neither going to burn wheat ricks, nor poison pheasants, but was simply "sugaring the trees for moths" as a blameless entomologist. And on the first appearance of Bewick's "British Birds," the excellent sportsman who brought it down to the Forest was asked, "Why on earth he had brought a book about cock sparrows?" and had to justify himself again and again, simply by lending the book to his brother sportsmen to convince them that there were rather more than a dozen sorts of birds indigenous to Hampshire.

But the book, perhaps, which turned the tide in favour of natural history was White's "History of Selborne." A Hampshire gentleman had taken the trouble to write about the birds and weeds in his own parish, and the every-day things which went on under his eyes and every one's else.

Many shrugged their shoulders, and said, "Poor fellow," till they opened the book itself, and discovered to their surprise that it "read like any novel." Then came a burst of honest admiration and exclamation : "Why, I have seen that and that a hundred times, and never thought till now how wonderful things were." And in like manner did Charles Kingsley in his little village of Eversley, and by his writings and



lectures to adult and youthful audiences, both in town and country, in simple unscientific phraseology discourse to his hearers of the wonders to be seen around. By these and other methods the study of natural history has become an honourable one. A Cromarty stonemason was till lately the most important man in the city of Edinburgh, by dint of hard work on fossil fishes; and the successful investigator of the minutest animals takes his place unquestioned among the men of genius, and, like the philosopher of old Greece, is considered by virtue of his science fit company for dukes and princes.

Kingsley in his wonderful book entitled "Glaucus, or the Wonders of the Shore," has in simple language given instructions, which if followed will make a holiday by the sea a delight. He tells us what to look for, where to find, and how to investigate. His description and sketch of the long sea-worm will show how carefully his observations were made. "Here is an animal, monstrous to the eye, and yet, so wondrously fitted to its work, that we must needs endure for our own instruction to handle, and to look at it. Its name we know not—though here it lurks under every stone—and should be glad to know. It seems some very low Ascarid, or Planarian worm. You see it? That black, shiny, knotted lump among the gravel, small enough to be taken up in a dessert spoon. Look now as it is raised, and its coils drawn out! Three feet—six—nine, at least; with a capability of seemingly endless expansion; a slimy tape of living caoutchouc some eighth of an inch in diameter, a dark chocolate black, with paler longitudinal lines. Is it alive? It hangs helpless and motionless—a mere velvet string across the hand. Ask the neigh-

bouring Annelids, and the fry of the rock fishes, or put it into a vase at home and see. It lies motionless, trailing itself along the gravel; you cannot tell where it begins or ends; it may be a dead strip of sea-weed, or even a tarred string. So thinks the little fish, who plays over and over it, till he touches at last what is too surely a head. In an instant a bell-shaped sucker has fastened to its side. In another instant, from one lip, a concave double proboscis, just like a tapir's, has clasped him like a finger. And now begins the struggle; but in vain. He is being 'played' with such a fishing line as the skill of a Wilson or a Stoddart never could invent; a living line, with an elasticity beyond that of the most delicate fly rod, which follows every lunge, shortening and lengthening, slipping and turning round every piece of gravel and stem of sea-weed, with a living drag, such as no Highland wrist or step could ever bring to bear on salmon or trout.

"The victim is tired now, and slowly, yet dexterously, his blind assailant is feeling and shifting along his side, till he reaches one end of him; and then the black lips expand, and slowly and surely the curved finger begins packing him, end foremost, down his gullet, where he sinks, inch by inch, till the swelling which marks his place is lost among the coils; and he is probably macerated to a pulp long before he has reached the opposite extremity of his cave of doom. Once safe down, the black murderer slowly contracts into a knotted heap, and lies, like a boa with a stag inside him, motionless and blest."

Such investigations as these Charles Kingsley pursued, thus giving us the priceless ideal of a perfect naturalist. During his sojourn at Torquay, he made

a rough list of about sixty species of Mollusks, Annelids, Crustacea, and Polypes, found on the shore, nearly all new to him, and recorded them in his "Glaucus," so as to assist those who should come after him. In speaking of this rough list, he remarks that it only serves as a specimen of the fertility of the water world. From the bare rocks above high-water mark, down to abysses deeper than ever plummet sounded, is life; fauna after fauna, and flora after flora, arranged in zones according to the light and warmth which each species requires, and to the amount of pressure which they are able to endure. The crevices of the highest rocks, only sprinkled with salt spray in spring tides and high gales, have their peculiar little univalves, their crisp, lichen-like seaweeds in myriads. Lower down, the region of the Fuci has its own tribes of periwinkles and limpets; below again, is the region of the Corallines and Algæ which furnish food for yet another species who graze on its watery meadows; and beneath all, only uncovered at low springtide, the zone of the Laminariæ (dark-spored seaweeds) is most full of all of every imaginable form of life.

During his rambles along the Cornish coast, Charles Kingsley came across a fellow-naturalist named Peach, who, though only a private in the mounted guard or Preventive Service in an obscure district of Cornwall, was one of the most interesting men who were in the habit of attending the annual meetings of the British Association. This man received but four shillings a day, and had a wife and nine children, most of whose education he had himself to conduct. He never tasted the luxuries which are so common in the middle ranks of life, and even amongst a large portion of the working classes. He had to mend with his own

hands every kind of article that could break or wear in his house. Yet with all this he was an ardent student of natural history. Not a student of the science in books, for he could not afford them; but an earnest and careful investigator by sea and shore, a collector of Zoophytes and Echinodermata (sea anemones, urchins, starfish, etc.). These he collected, preserved, and described, and each year went up to the meetings of the British Association with a few novelties, accompanied by illustrative papers and drawings; thus adding to the general store of knowledge.

Kingsley often referred to this man as an example of what might be done under such a complication of duties, professional and domestic; and he looked upon this humble worker as an honour to the assemblage of nobles and doctors—nay more, an honour to human nature itself.

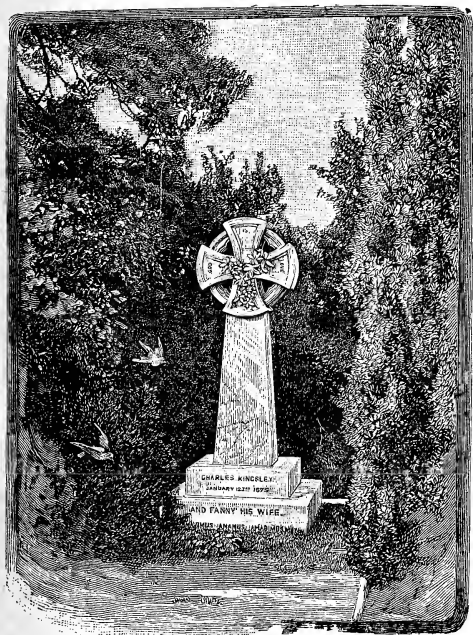
Charles Kingsley soon became known by his writings, not only upon natural history, but upon other subjects which are still so popular—thirty-six volumes in all; most of them written in order to keep himself clear of debt, he being oft-times in straitened circumstances, and not always able to keep a curate. But the time came when he was recognised, if not as one of the “world’s wonders,” at least one of earth’s worthies; and in the bright days that followed, he became chaplain to the Queen, tutor to the Prince of Wales, and Canon of Westminster, but still remaining rector of Eversley.

At length “the body, that machine for acting,” was out of gear and would work no longer. He felt, as the greatest man must do, when he has turned the hill at last; younger spirits will rise up after him and catch the lamp of truth—as in the old lamp-bearing

race of Greece—out of his hand before it expires, and carry it to the goal with swifter and more even feet, that in

“This way success might be.”

So in January 1875, at the early age of fifty-five,



KINGSLEY'S GRAVE IN EVERSLEY CHURCHYARD.

(From photo by F. M. Good, Winchfield.)

worn out with having crowded into the short years as magnificent a work as an Englishman ever did, Charles Kingsley laid himself down to his final rest in this world, and by his own desire was buried in the little churchyard of Eversley in the spot he himself had chosen.

Men of all stations and climes came to his funeral to pay their last token of love ; soldiers, sailors, and statesmen mingled with ministers and learned men, in the crowd which thronged round the open grave, and for weeks afterwards the turf around was trodden down by many footsteps ; even little children came from far to see the resting place of the author of *Water Babies* ; and the gipsies, who used to call him their “priest king,” never went by the gate without passing in to stand at the grave, believing, as they say in their strange way, that he went to heaven on the prayers of the gipsies.

THE END.

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